

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## **M E M O R A N D U M**

**TO:** John Mitnik, Assistant Executive Director, Executive Office Staff

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** February 23, 2022

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### **Weather Conditions and Forecast**

Breezy easterly winds will continue to deliver periodic scattered showers to the eastern side of the District; the next frontal passage is scheduled to arrive on Monday. Anomalous ridging over the Eastern US and NW Atlantic will remain in place until this Sunday, after which a weakening of the ridge and a return to upper-troughing in the Eastern US will give way to the next frontal passage early next week. With this ridge in place, the predominant wind direction will be from the east, and scattered showers are forecast as the easterly winds blow in from the Atlantic. A temporary increase in the easterly flow could cause a greater coverage of the scattered showers today and on Thursday. However, Friday and Saturday look dry as the persistent ridging will help transport a region of dry midlatitude air near Bermuda westward into the District, limiting shower activity. On Sunday, shower activity could increase over the southern part of the District and the upper Kissimmee Valley as the next frontal system approaches. On Monday, showers are likely to remain in place over the southern part of the District as the cold front propagates south, returning cooler and drier conditions across the District. The first 7-day period will feature well below normal rainfall. The second 7-day period beginning in week 2 could also be below average but slightly wetter than week 1.

#### **Kissimmee**

Flow at S-65/S-65A is being reduced slowly to prepare for stage recessions on KCH and the Kissimmee River, and water depth on the Kissimmee River floodplain decreased with a mean depth of 0.38 feet as of February 20, 2022. The concentration of dissolved oxygen in the Kissimmee River has remained well above the region of concern, with an average of 8.5 mg/L for the week ending on February 20, 2022.

#### **Lake Okeechobee**

Lake Okeechobee stage was 14.72 feet NGVD on February 20, 2022 and it was 0.41 feet lower than a month ago (**Figure LO-1**). Lake stage fell back to within the ecological envelope on January 1, 2022, after being above the envelope since late September 2021, and having spent a total of 279 days (79%) in 2021 above the envelope (**Figure LO-2**).

Average daily inflows (excluding rainfall) decreased from the previous week, going from 1,171 cfs to 1,108 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week, going from 1,355 cfs to 2,706 cfs. Approximately 2,480 wading birds were observed foraging on the Lake in mid-February and long-legged birds have initiated nesting activities (**Figure LO-6**). Recent satellite imagery (February 20, 2022) showed scattered areas of low to moderate bloom potential along the western and southwestern shorelines (**Figure LO-8**).

### **Estuaries**

Total inflow to the St. Lucie Estuary averaged approximately 181 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities increased slightly at all sites in the estuary over the past week. Salinity at the US1 Bridge was in the good range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 2,032 cfs over the past week with 1,568 cfs coming from the Lake. Mean salinities remained the same at S-79 and Val I-75 and increased at the remaining sites in the estuary over the past week. Salinities were in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities were also in the good range (10-30) for adult eastern oysters at Cape Coral, Shell Point, and Sanibel.

### **Stormwater Treatment Areas**

For the week ending Sunday, February 20, 2022, approximately 600 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 80,800 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 983,000 ac-feet. Most STA cells are at or near target stage, except portions of STA-5/6 cells that are drying out. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-1E Eastern Flow-way is offline for rip-rap repairs related to Tropical Storm Eta. Additionally, STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown, STA-2 Flow-way 2 is offline for construction activities, and STA-5/6 Flow-way 4 is offline for vegetation management activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways for construction activities. Operational restrictions are in effect in STA-1E Central Flow-way and STA-2 Flow-ways 1, 3 and 4 for vegetation management activities. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

### **Everglades**

Stage change within most of the WCAs was elevated above the optimal range. Expectations for wading bird nesting this year are average to below average, with very limited nesting probable at the Alley North colony. Expectations are for the elevated recessions normally experienced this time of year in CSSS subpopulations will create drier conditions more conducive to nesting as we approach the breeding season. Conditions remained fair in Taylor Slough and Florida Bay last week. Salinities rose slightly last week, and stages fell but remain high in northern Taylor slough.

## **Supporting Information**

### **Kissimmee Basin**

#### ***Upper Kissimmee***

On February 20, 2022, lake stages were 57.2 feet NGVD (0.8 feet below schedule) in East Lake Toho, 53.8 feet NGVD (1.2 feet below schedule) in Lake Toho, and 49.5 feet NGVD (2.0 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

#### ***Lower Kissimmee***

Discharges to the Kissimmee River on February 20, 2022 were 1,040 cfs at S-65 and 960 cfs at S-65A; discharges from the Kissimmee River were 1,160 cfs at S-65D and 1,030 cfs at S-65E (**Table KB-2**). Headwater stages were 46.3 feet NGVD at S-65A and 26.6 feet NGVD at S-65D on February 20, 2022. With lower water temperatures, the concentration of dissolved oxygen is well above the region of concern, with an average of 8.5 mg/L for the week ending on February 20, 2022 (**Table KB-2, Figure KB-4**). Flow at S-65/S-65A is being reduced slowly to prepare for stage recessions on KCH and the Kissimmee River, and water depth on the Kissimmee River floodplain decreased with a mean depth of 0.38 feet as of February 20, 2022 (**Figure KB-5**).

#### ***Water Management Recommendations***

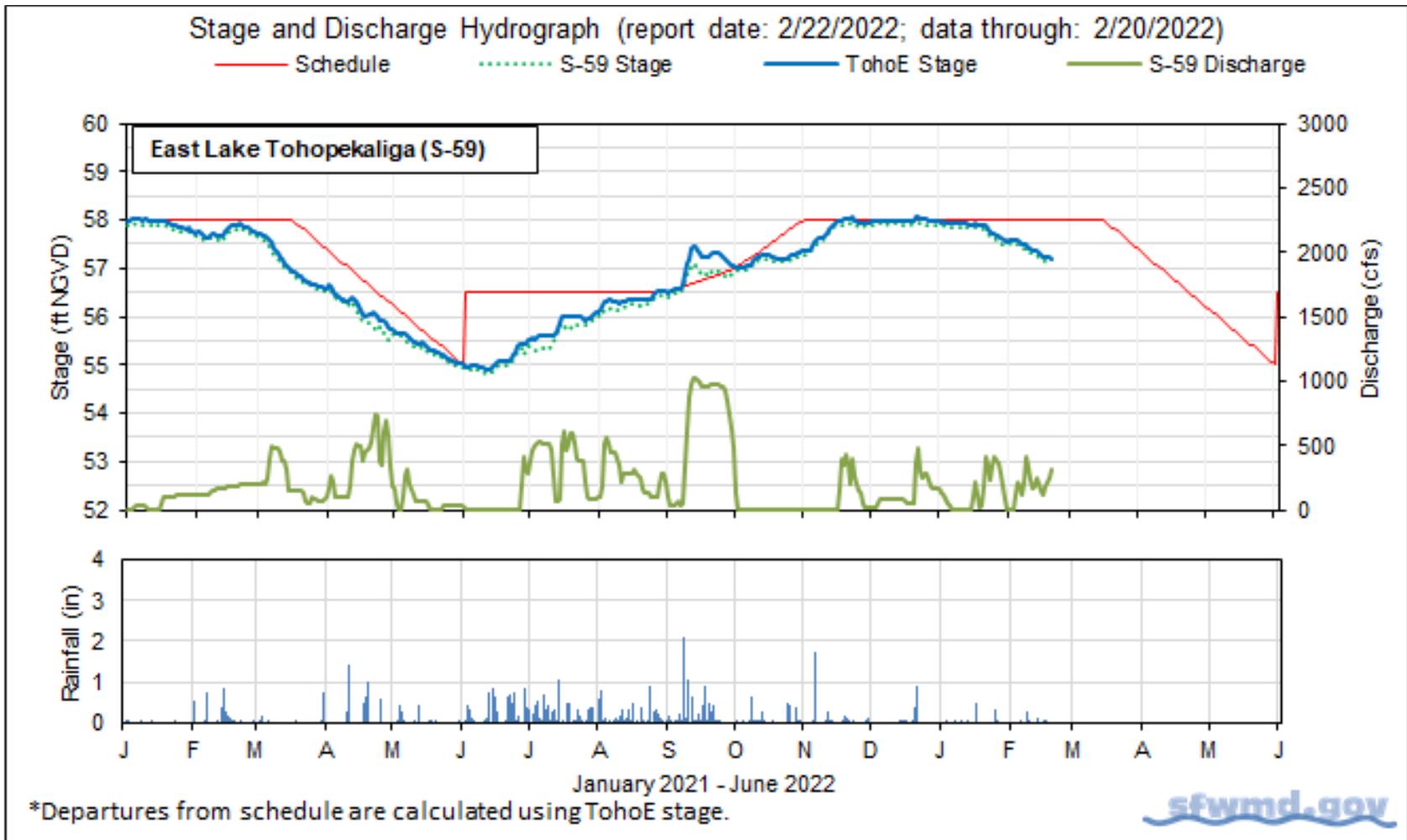
Managed stage recessions for snail kite nesting season were started on Lakes Toho and East Toho on January 15, 2022 to gradually reduce lake stages to their low pools by June 1. In Kissimmee-Cypress-Hatchineha, continue to keep stage slowly declining while maintaining at least 300 cfs at S-65A and following the IS-14-50 discharge plan (**Figure KB-6**) for S-65 and S-65A.

**Table KB-1.** Average discharge for the preceding seven days and Sunday's average daily stage and departures from KCL flood regulation or temporary schedules. All data are provisional.

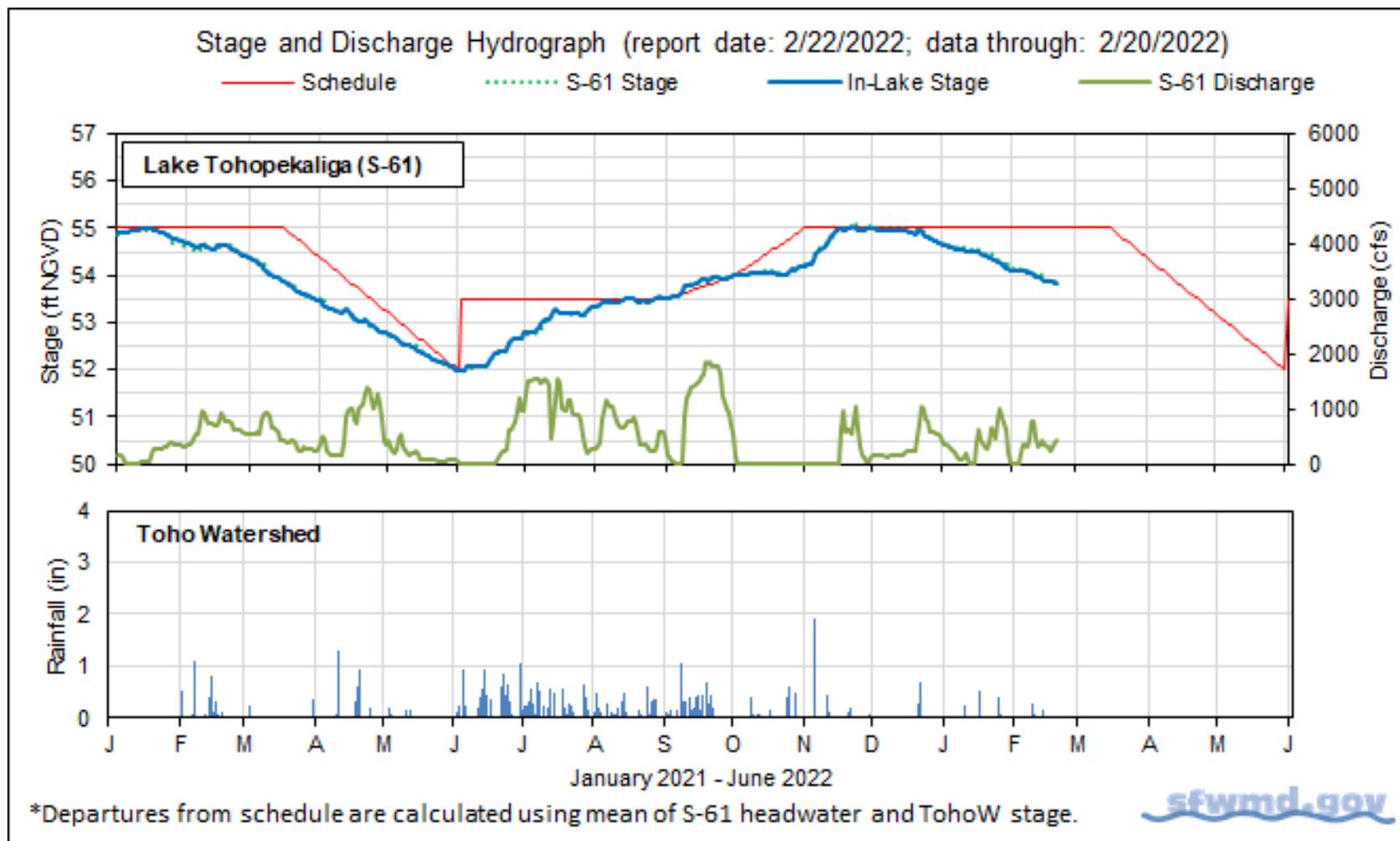
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							2/20/22	2/13/22
Lakes Hart and Mary Jane	S-62	LKMJ	46	60.9	R	61.0	-0.1	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	15	60.9	R	61.0	-0.1	0.0
Alligator Chain	S-60	ALLI	13	64.0	R	64.0	0.0	0.0
Lake Gentry	S-63	LKGT	22	61.5	R	61.5	0.0	0.0
East Lake Toho	S-59	TOHOE	210	57.2	R	58.0	-0.8	-0.6
Lake Toho	S-61	TOHOW S-61	357	53.8	R	55.0	-1.2	-1.0
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	1,099	49.5	R	51.5	-2.0	-2.2

a. Names of in-lake monitoring sites and structures used to determine lake stage. If more than one site is listed, an average is reported.

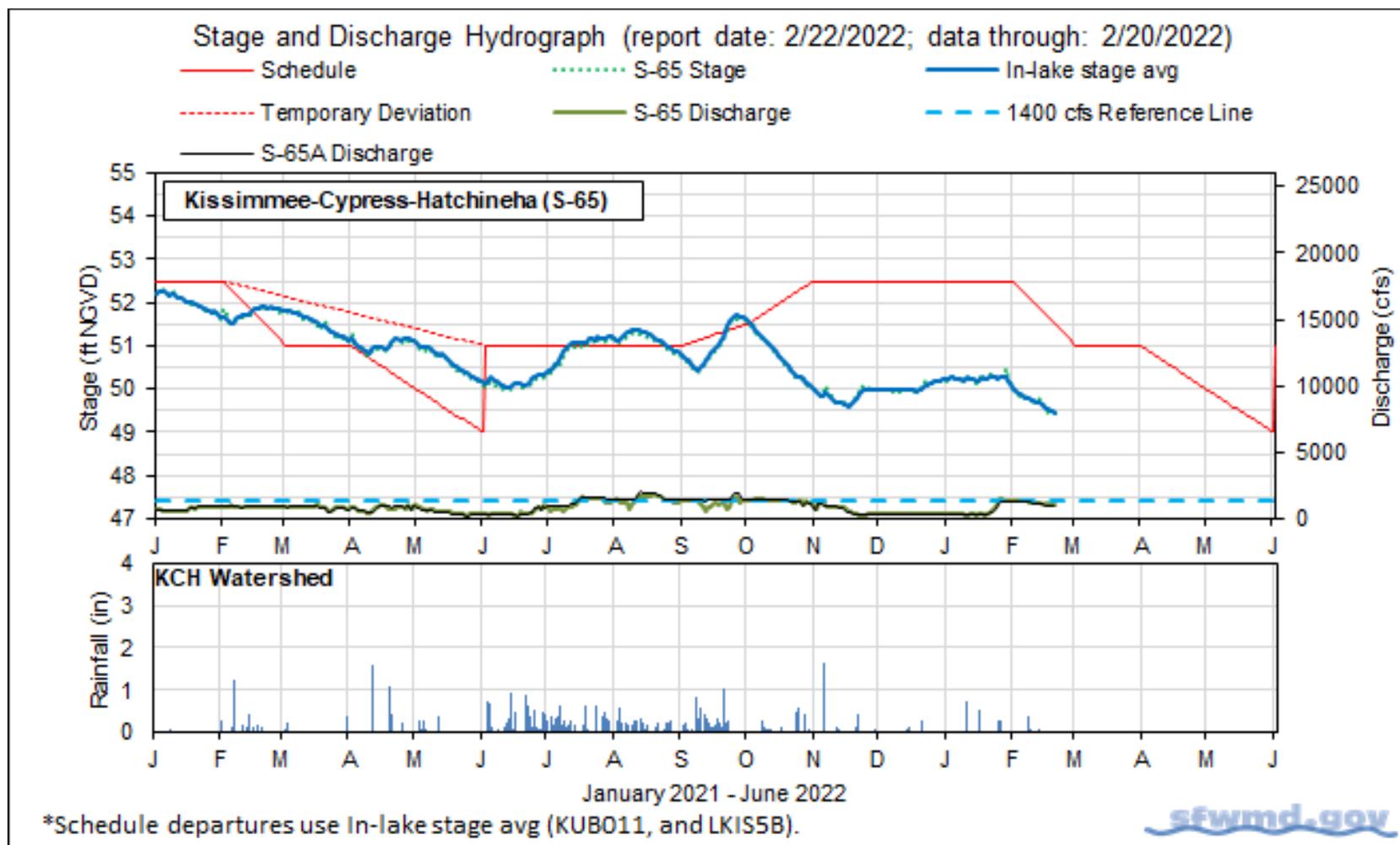
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**Figure KB-1.** East Lake Toho regulation schedule, stage, discharge and rainfall.



**Figure KB-2.** Lake Toho regulation schedule, stage, discharge and rainfall.



**Figure KB-3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

**Table KB-2.** One- and seven-day average discharge and stage at Lower Kissimmee basin structures, river channel dissolved oxygen concentrations and water depths in the Phase I area floodplain. All data are provisional.

Metric	Location	Daily Average 2/20/22	Average for Previous Seven Day Periods			
			2/20/22	2/13/22	2/6/22	1/30/22
Discharge	S-65	1,040	1,100	1,240	1,380	1,310
Discharge	S-65A <sup>a</sup>	960	1,020	1,180	1,270	1,190
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.3	46.3	46.4
Discharge	S-65D <sup>b</sup>	1,160	1,170	1,170	1,110	840
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	26.6	26.6	26.7	26.7	26.6
Discharge (cfs)	S-65E <sup>d</sup>	1,030	1,070	1,100	1,060	820
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	8.4	8.5	8.5	9.6	9.1
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.38	0.40	0.44	0.34	0.27

a. Combined discharge from main and auxiliary structures.

b. Combined discharge from S-65D, S-65DX1 and S-65DX2.

c. Average stage from S-65D and S-65DX1.

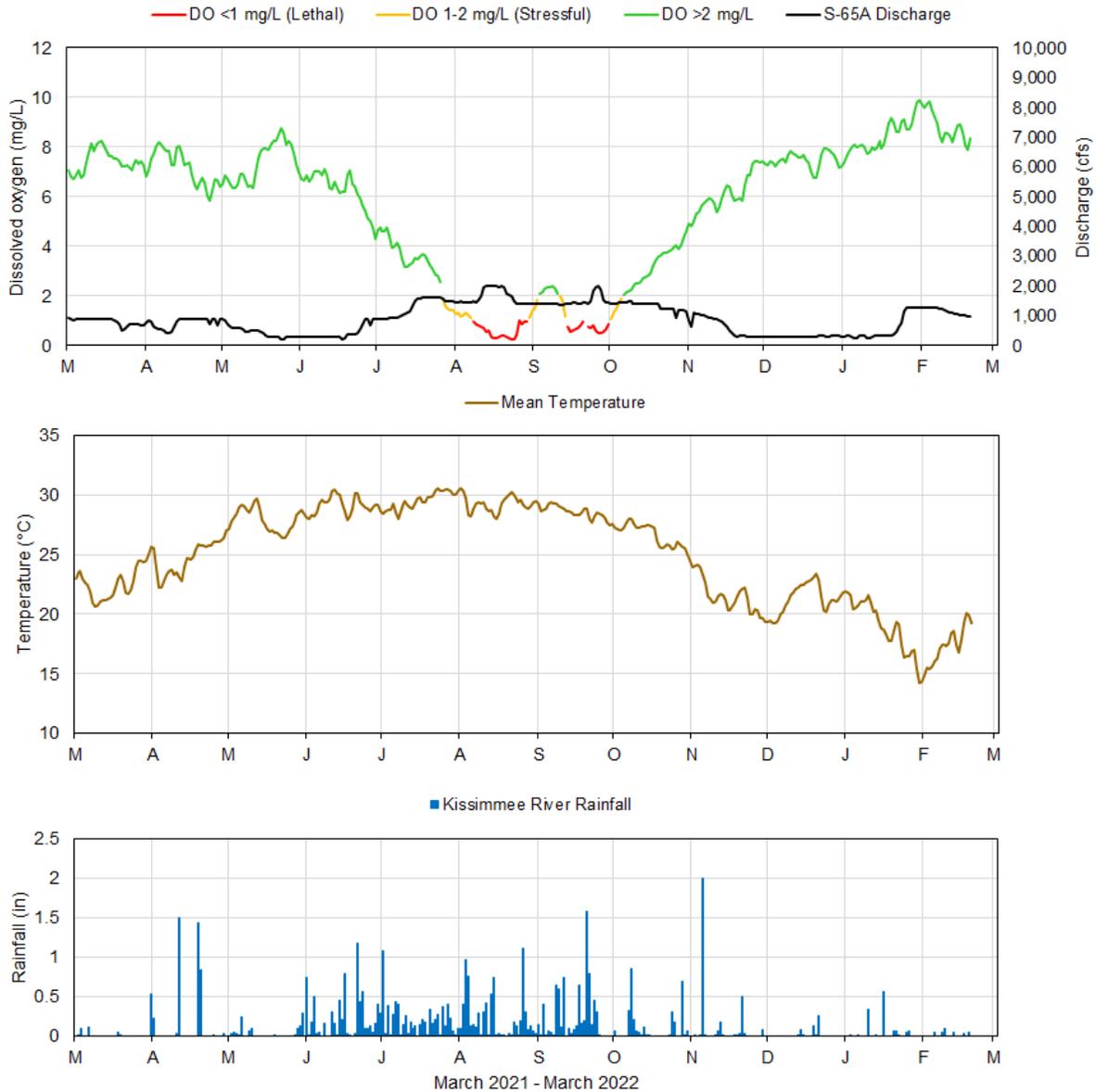
d. Combined discharge from S-65E and S-65EX1.

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R and PD42R.

f. One-day spatial average obtained from the South Florida Water Depth Assessment Tool (SFWDAT).

**Table KB-3.** Discharge rate of change limits for S65/S-65A (revised 1/14/19).

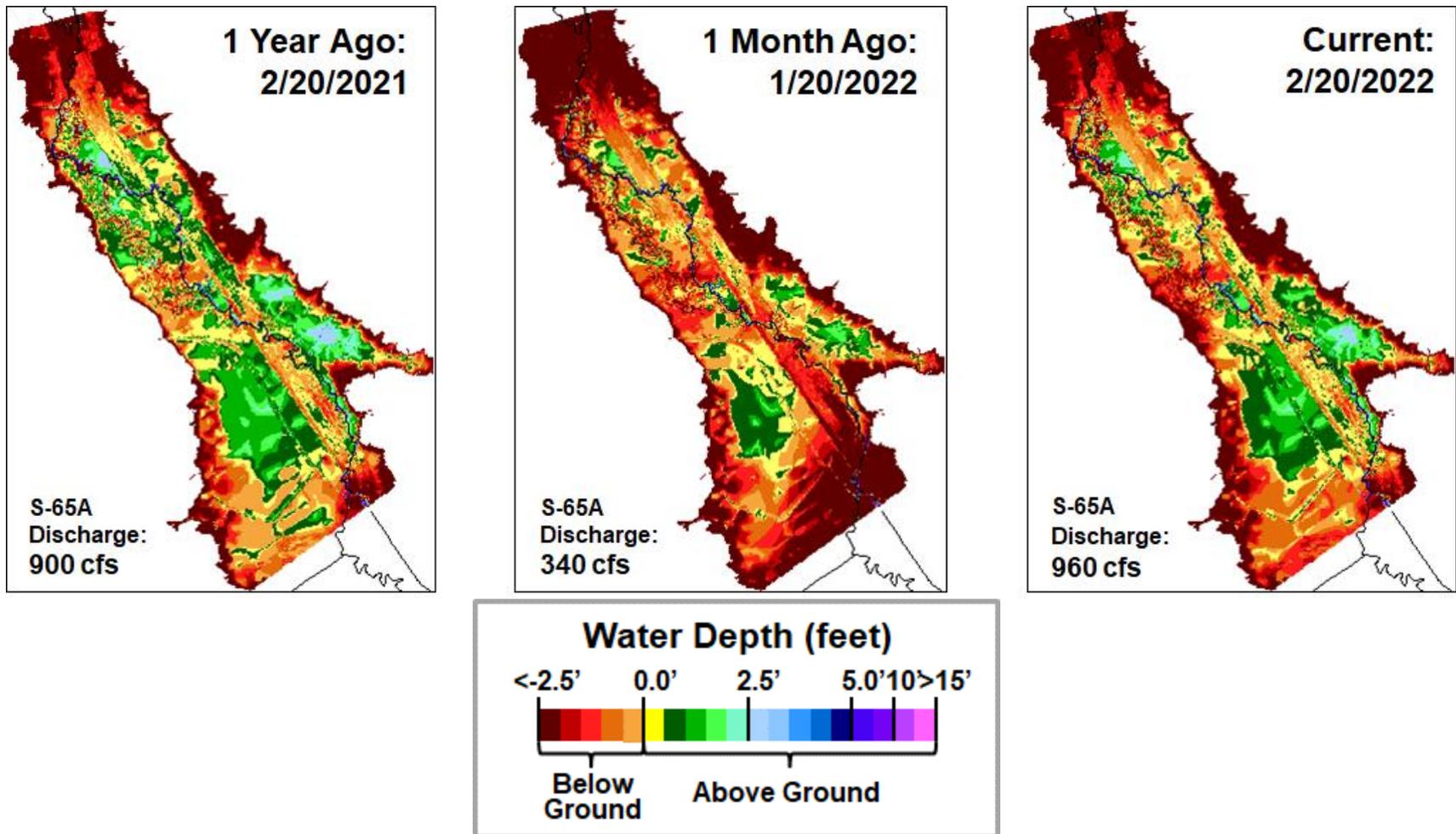
<b>Discharge (cfs)</b>	<b>Maximum Rate of Increase (cfs/day)</b>	<b>Maximum Rate of Decrease (cfs/day)</b>
0-300	100	-50
301-650	150	-75
651-1,400	300	-150
1,401-3,000	600	-600
>3,000	1,000	-2,000



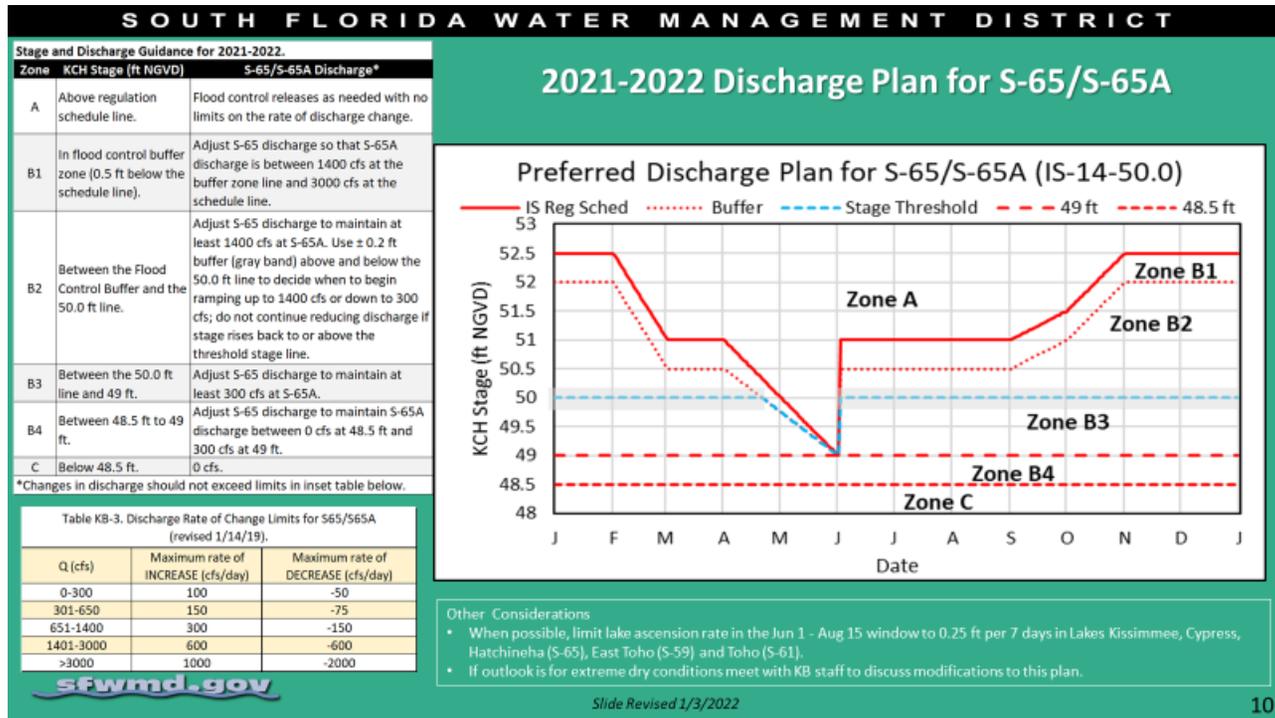
Report Date: 2/22/2022; data are through: 2/20/2022



**Figure KB-4.** Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R, and PD42R with an average of four stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.



**Figure KB-5.** Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.



**Figure KB-6.** IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

## Lake Okeechobee

Lake Okeechobee stage was 14.72 feet NGVD on February 20, 2022, with water levels 0.41 feet lower than a month ago (**Figure LO-1**). Lake stage remains in the Low sub-band (**Figure LO-2**) and is still within the ecological envelope, having spent 279 days (79%) of the last year above the envelope (**Figure LO-3**). Approximately 2,480 wading birds were observed foraging on the Lake in mid-February and long-legged birds have initiated nesting activities. According to NEXRAD, 0.06 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 1,171 cfs to 1,108 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week, going from 1,355 cfs to 2,706 cfs. Highest inflows came from the Kissimmee River through the S-65E structure (1,074 cfs). The highest outflow (1,665 cfs) was to the west via the S-77 structure, while 780 cfs flowed east via the S-308 structure and 148 cfs flowed south via the S-350 structures. **Figures LO-4 and LO-5** show the combined average daily inflows and outflows for the Lake over the past eight weeks, and average inflows and outflows last week, respectively. These data are provisional and are subject to change.

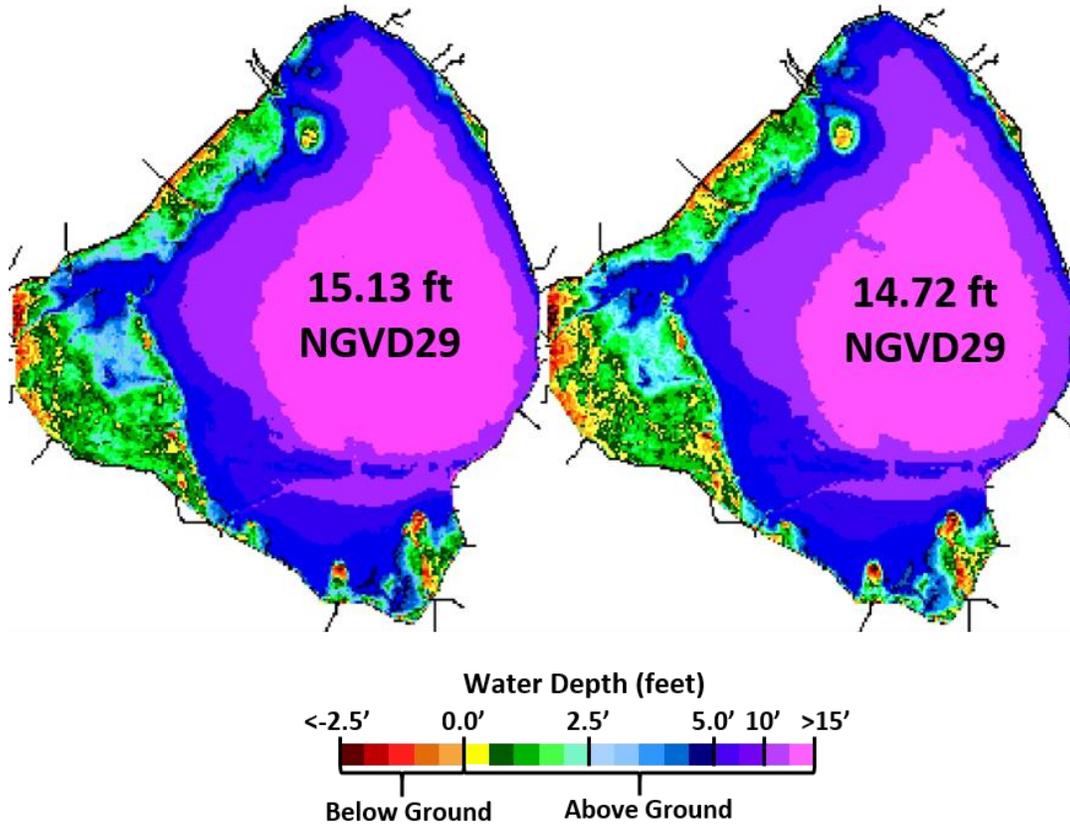
The third wading bird survey of the 2022 breeding season (conducted February 17, 2022) reported approximately 2,480 foraging wading birds on the Lake, compared to about 6,480 on the January 6, 2022 survey and 1,650 on the December 2, 2021 survey (**Figure LO-6**). The first three surveys of this year appear to be following the same pattern as the average number of birds per survey over the past five breeding seasons. Long-legged wading birds have initiated nesting activities and suitable foraging habitat has increased with declining water levels. If Lake stages continue to decline and stay within the ecological envelope throughout the spring, there should be good foraging and nesting conditions for wading birds on the Lake this breeding season.

Water quality sampling is on the non-bloom season schedule (November – April), occurring once monthly at approximately 30 stations for chlorophyll-*a*, and at 9 stations for taxonomic identification and toxin analyses. The February sampling occurred on the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup>. Results for chlorophyll-*a* showed four sites along the south and southwestern shore above the bloom threshold of 40 µg/L and eight sites between 20 µg/L and 40 µg/L. All samples had below detectable levels of cyanotoxins and algal communities were described as mostly mixed (**Table LO-1** and **Figure LO-7**).

The most recent satellite image (February 20, 2022) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor showed scattered areas of low to moderate bloom potential along the western and southwestern shorelines (**Figure LO-8**).

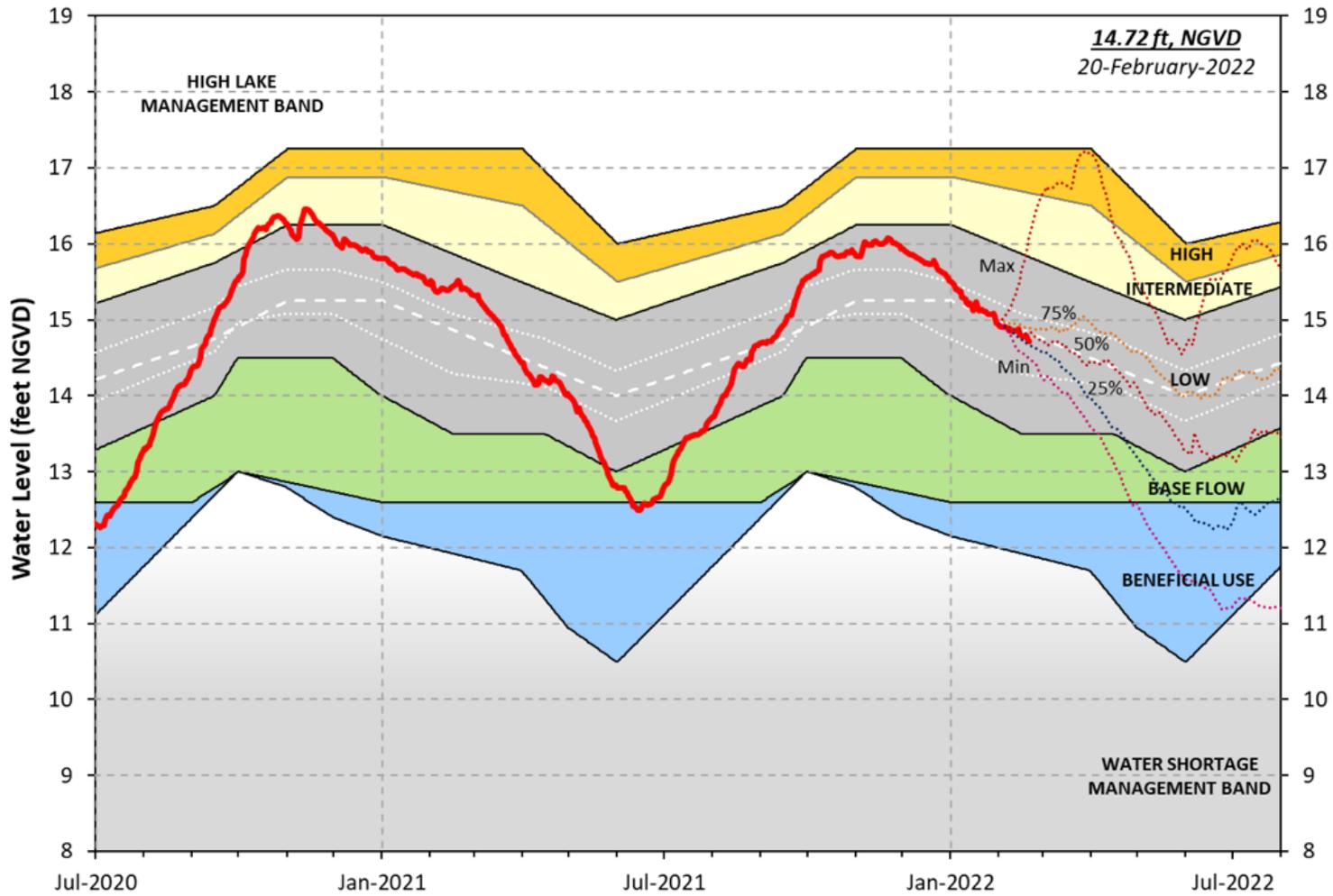
1 Month Ago:  
01/21/2022

Current:  
02/20/2022



**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

## Lake Okeechobee Water Level History and Projected Stages



LORS-2008 - Adopted by USACE 28-April-2008

**Figure LO-2.** Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

### Lake Okeechobee Stage vs Ecological Envelope

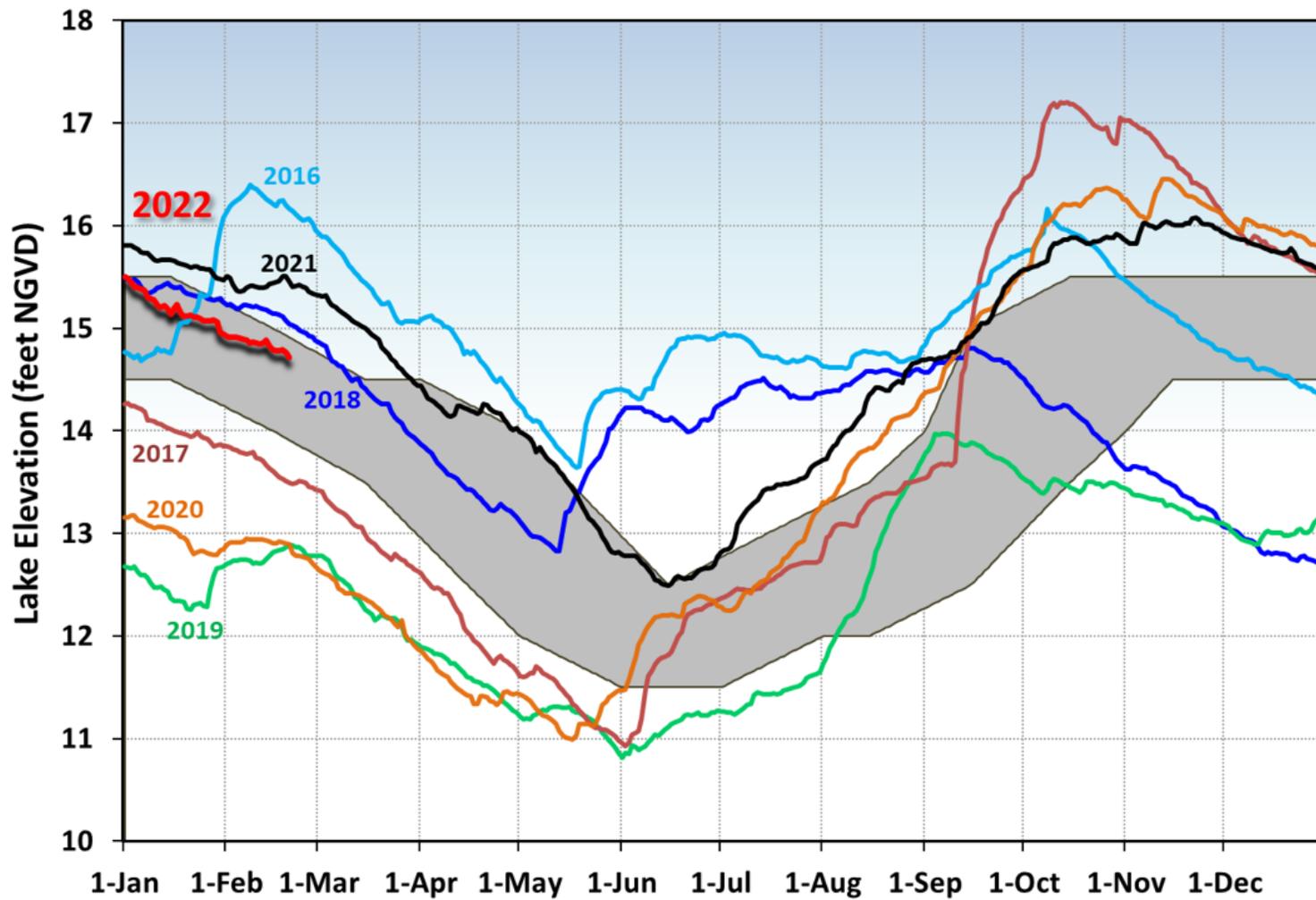
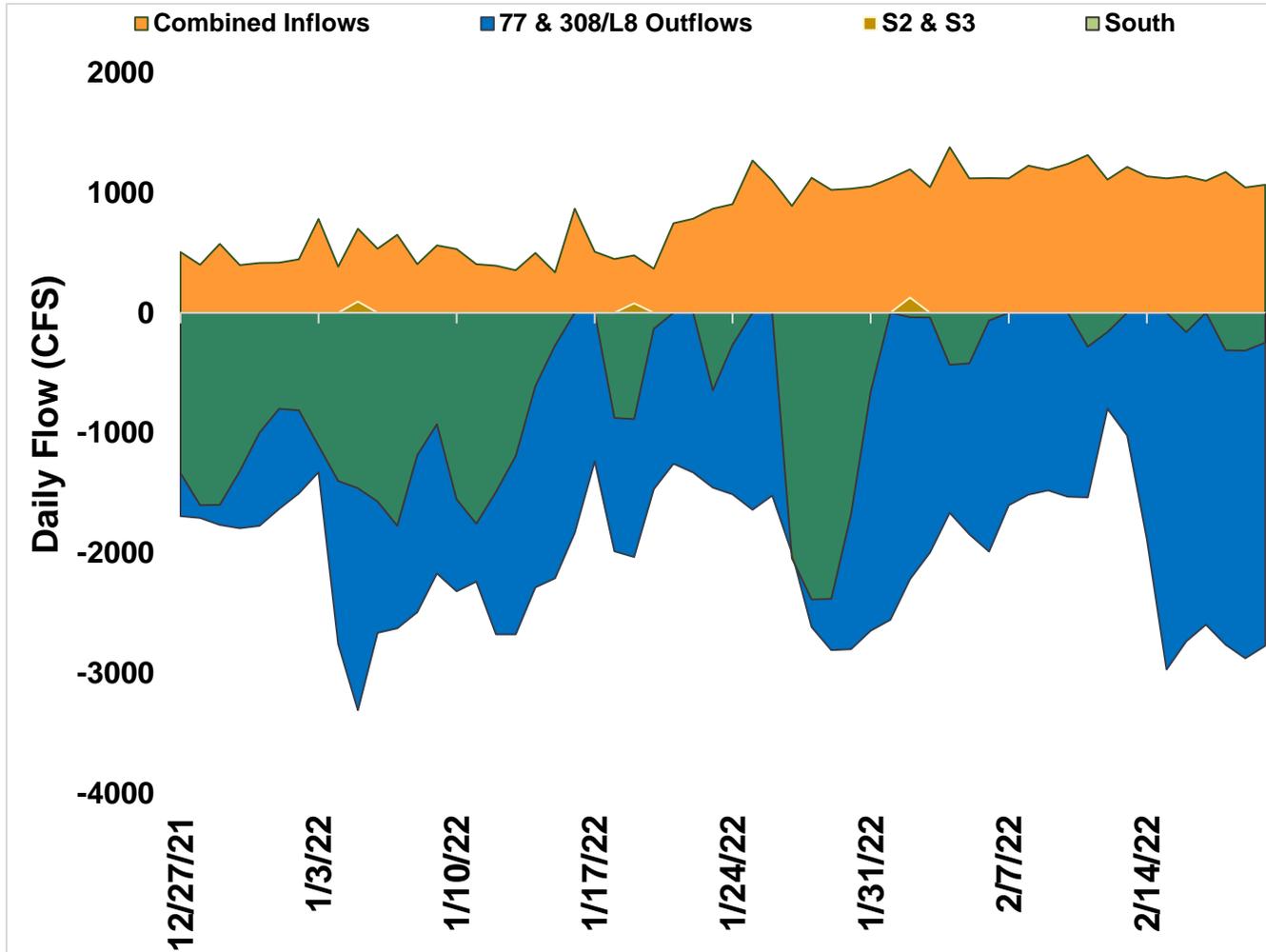
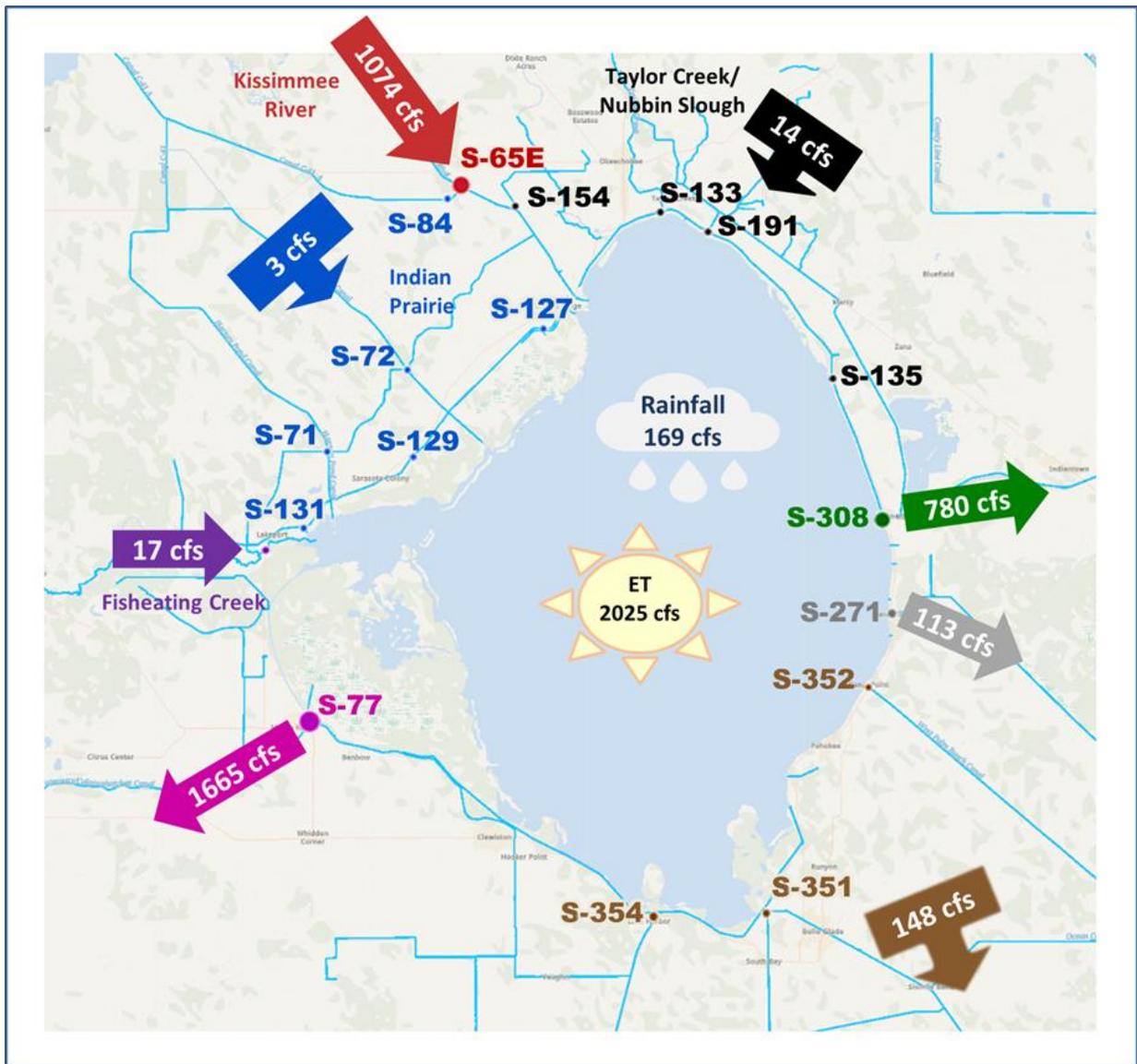


Figure LO-3. The prior six years of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.



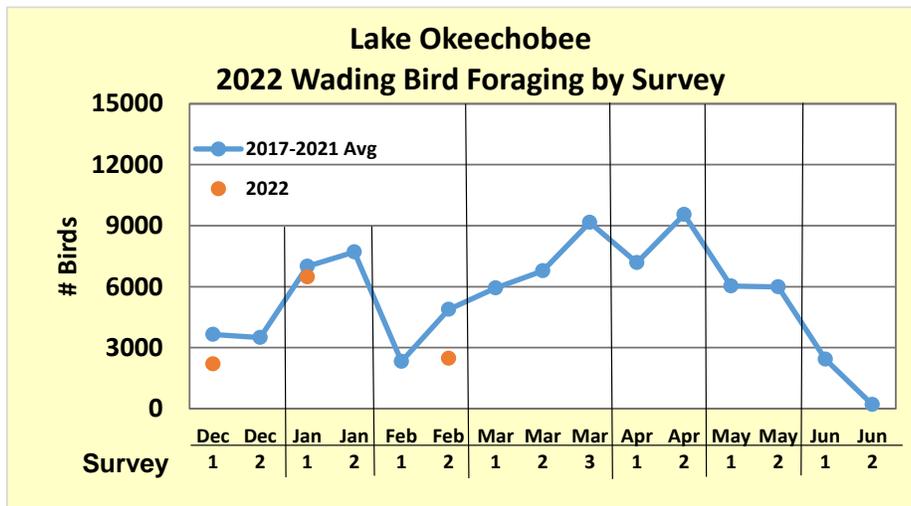
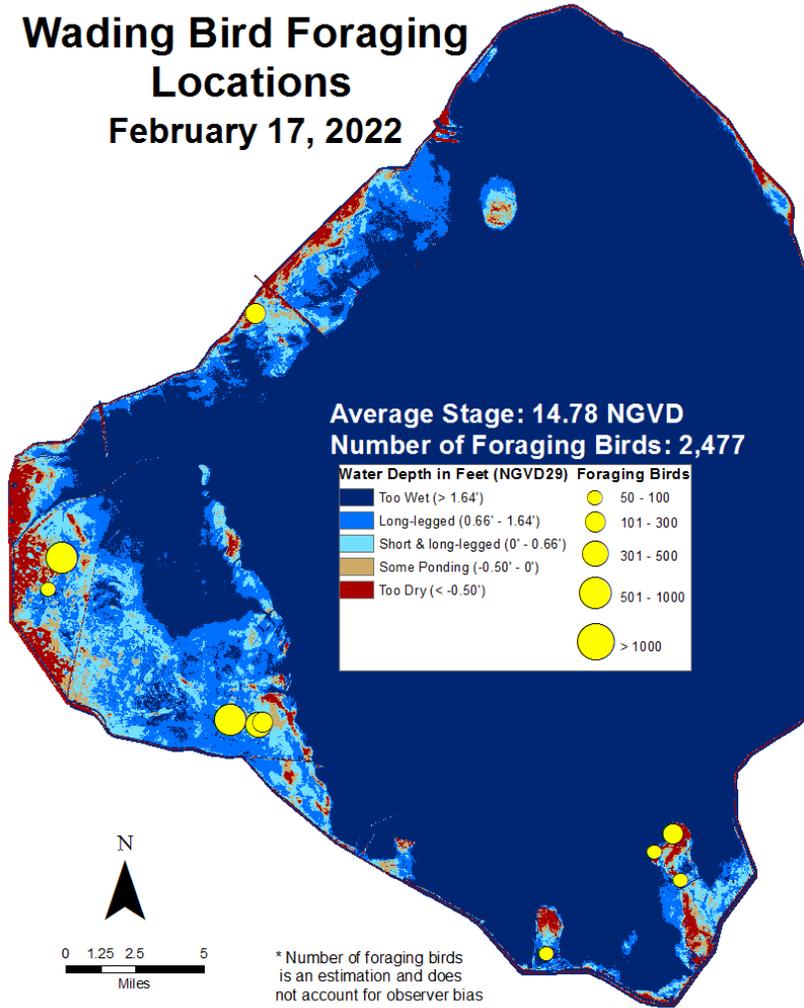
**Figure LO-4.** Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 or C-44 canals are included with outflows. Inflows are shown as positive values; outflows are negative. Outflows through the S-77 (Caloosahatchee) and S-308 (C-44 Canal) structures are based on downstream gauges to include flows to lock openings for navigation.



**Figure LO-5.** Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of February 14, 2022 – February 20, 2022.

# Wading Bird Foraging Locations

## February 17, 2022



**Figure LO-6.** Locations of foraging flocks of wading birds observed during a monitoring flight on February 17, 2022 (map on left) are shown in yellow (circle sizes represents the flock size). Previous survey averages from the last five breeding seasons (blue line) compared to the 2022 breeding season (orange dots) thus far is seen in the graph on the right.

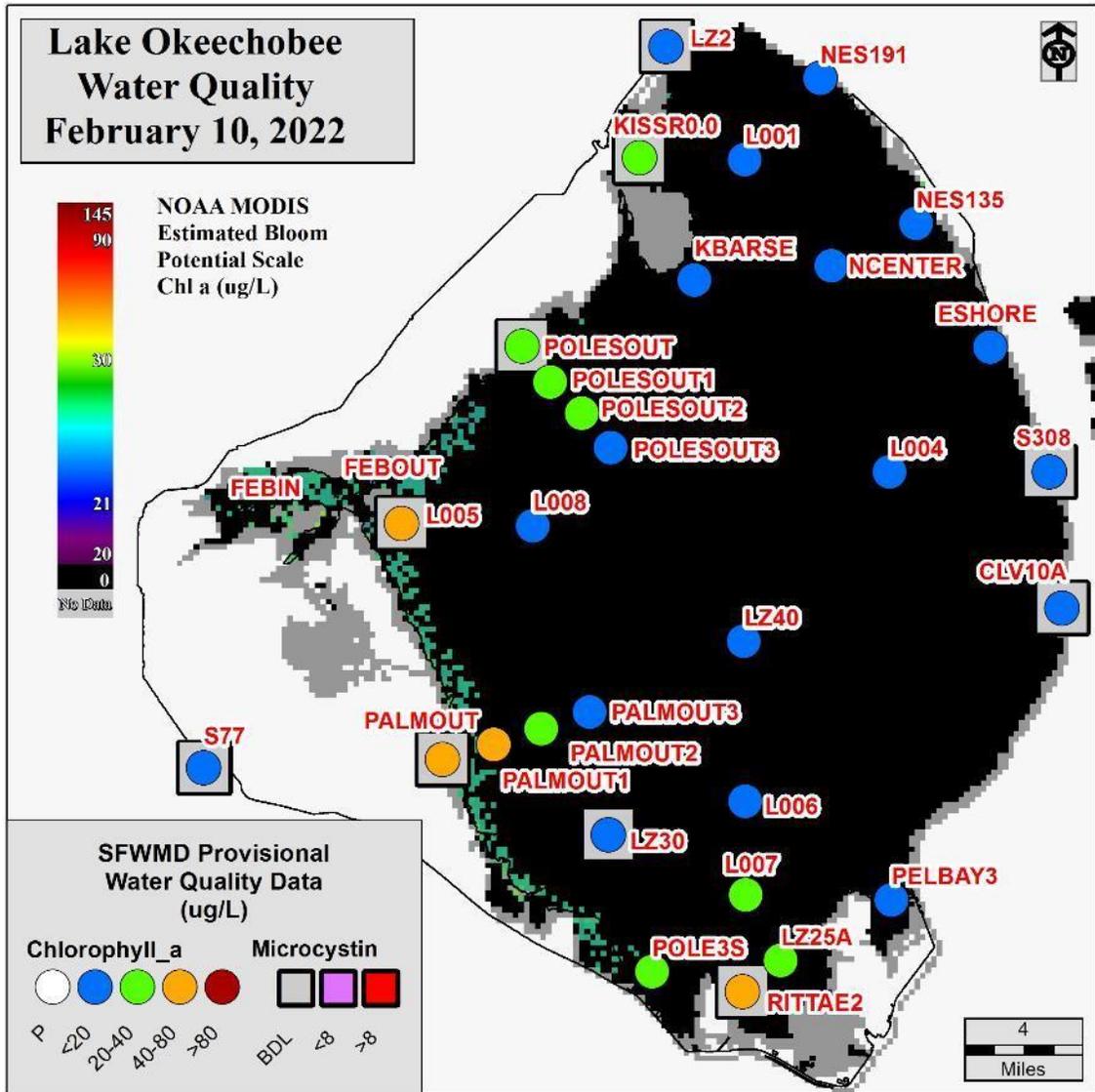
**Table LO-1.** Provisional results of chlorophyll *a* and toxin concentrations and cyanobacteria taxa from sampling trips on February 7-9, 2022. Color coding is the same as on **Figure LO-7**.

Station	CHL <i>a</i> (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	NS		
FEBOUT	NS		
KISSR0.0	<b>27.9</b>	BDL	<i>mixed</i>
L005	<b>42.7</b>	BDL	<i>Cylindro</i>
LZ2	12.9	BDL	<i>mixed</i>
KBARSE	19.4		
RITTAE2	<b>40.0</b>	BDL	<i>mixed</i>
PELBAY3	6.0		
POLE3S	<b>33.6</b>		
LZ25A	<b>29.0</b>		
PALMOUT	<b>50.1</b>	BDL	<i>Cylin/Pseud</i>
PALMOUT1	<b>52.6</b>		
PALMOUT2	<b>27.9</b>		
PALMOUT3	11.4		
POLESOUT	<b>36.1</b>	BDL	<i>mixed</i>
POLESOUT1	<b>35.2</b>		
POLESOUT2	<b>24.2</b>		
POLESOUT3	18.4		
EASTSHORE	6.5		
NES135	7.3		
NES191	13.0		

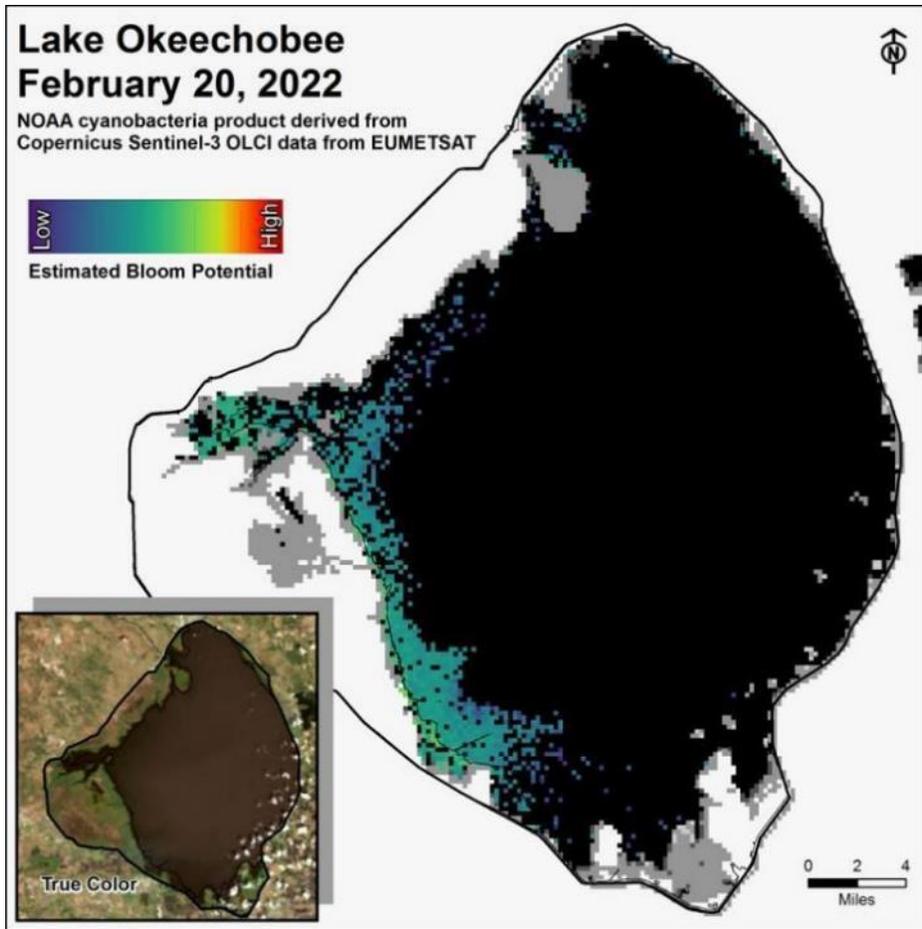
Station	CHL <i>a</i> (ug/L)	TOXIN (ug/L)	TAXA
L001	9.6		
L004	10.3		
L006	7.1		
L007	<b>36.8</b>		
L008	9.2		
LZ30	13.8	BDL	<i>mixed</i>
LZ40	9.8		
CLV10A	8.8	BDL	<i>mixed</i>
NCENTER	11.4		

S308C	6.2	BDL	<i>mixed</i>
S77	19.2	BDL	<i>Microcys</i>

- SFWMD considers >40 µg/L Chlorophyll *a* (Chl*a*) an algal bloom
- BDL – Below Detectable Limit of **0.25** µg/L
- ND – No Dominant taxa
- P – Pending
- NS – Not Sampled
- Station bold font – crew observed possible BGA
- Chlorophyll *a* analyzed by SFWMD
- Toxin and Taxa analyzed by FDEP:  
*Microcys* = *Microcystis*; *Cylindro* = *Cylindrospermopsis*;  
*Pseud* = *Pseudanabaena*; *Dolicho* = *Dolichospermum*



**Figure LO-7.** Expanded monitoring network and provisional results from samples collected February 7-9, 2022.



**Figure LO-8.** Cyanobacteria bloom potential on February 20, 2022 based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

## Estuaries

### ***St. Lucie Estuary***

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 181 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 252 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, surface salinities increased slightly at all sites within the estuary (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 23.4. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

### ***Caloosahatchee River Estuary***

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 2,032 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 2,057 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, surface salinities remained the same at S-79 and Val I-75 and increased at the remaining sites in the estuary (**Table ES-2 and Figures ES-7 and ES-8**). The seven-day mean surface salinities (**Table ES-2**) were in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The seven-day mean surface salinity values were also within the good range for adult eastern oysters at Cape Coral, Shell Point, and Sanibel (**Figure ES-9**).

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013<sup>1</sup>) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1,500 cfs and a steady release at 2,000 cfs with estimated tidal basin inflows of 67 cfs. Model results from all scenarios predict daily salinity to be 1.2 or lower and the 30-day moving average surface salinity to be 0.4 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

### ***Red Tide***

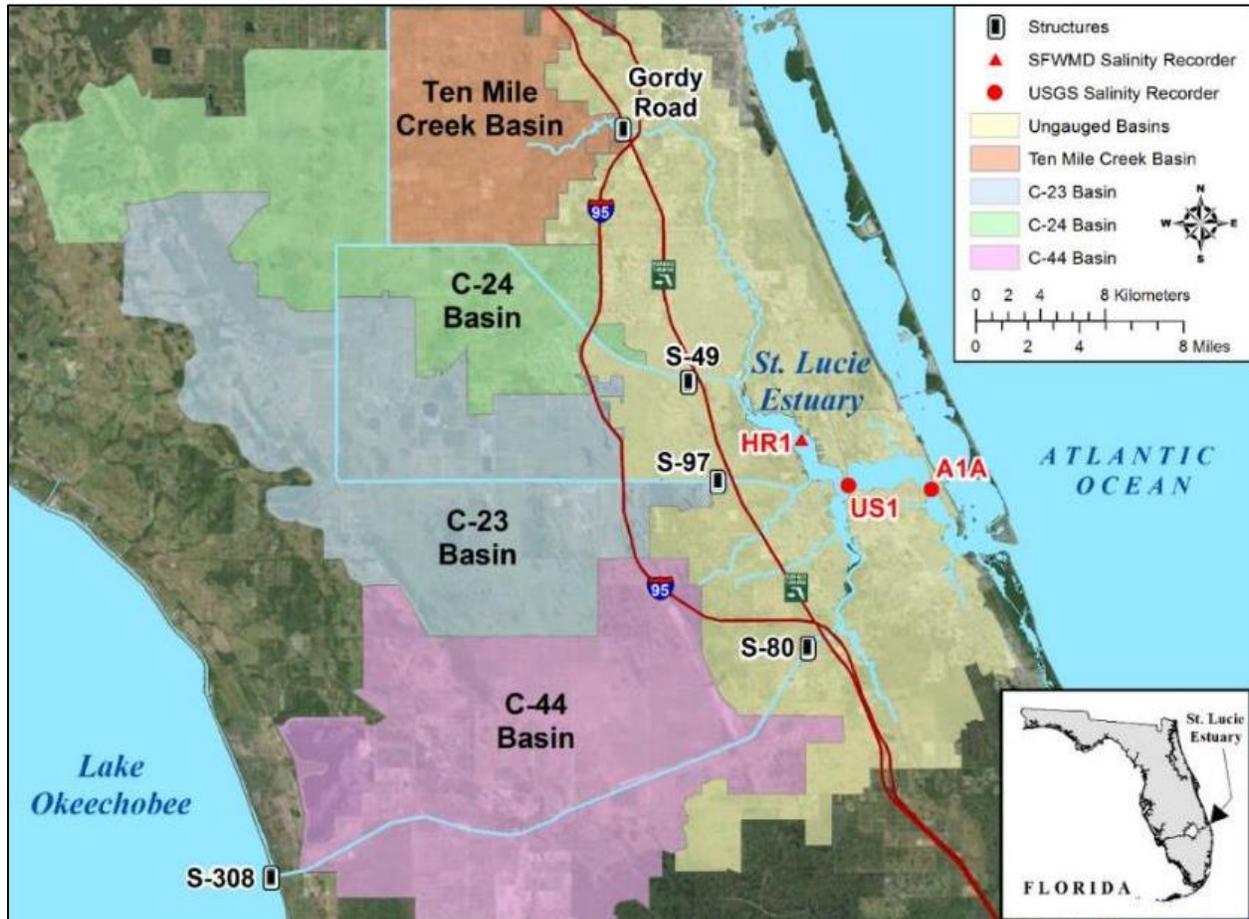
The Florida Fish and Wildlife Research Institute reported on February 18, 2022, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in any samples collected statewide. On the east coast, red tide was not observed in samples from Palm Beach County.

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<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

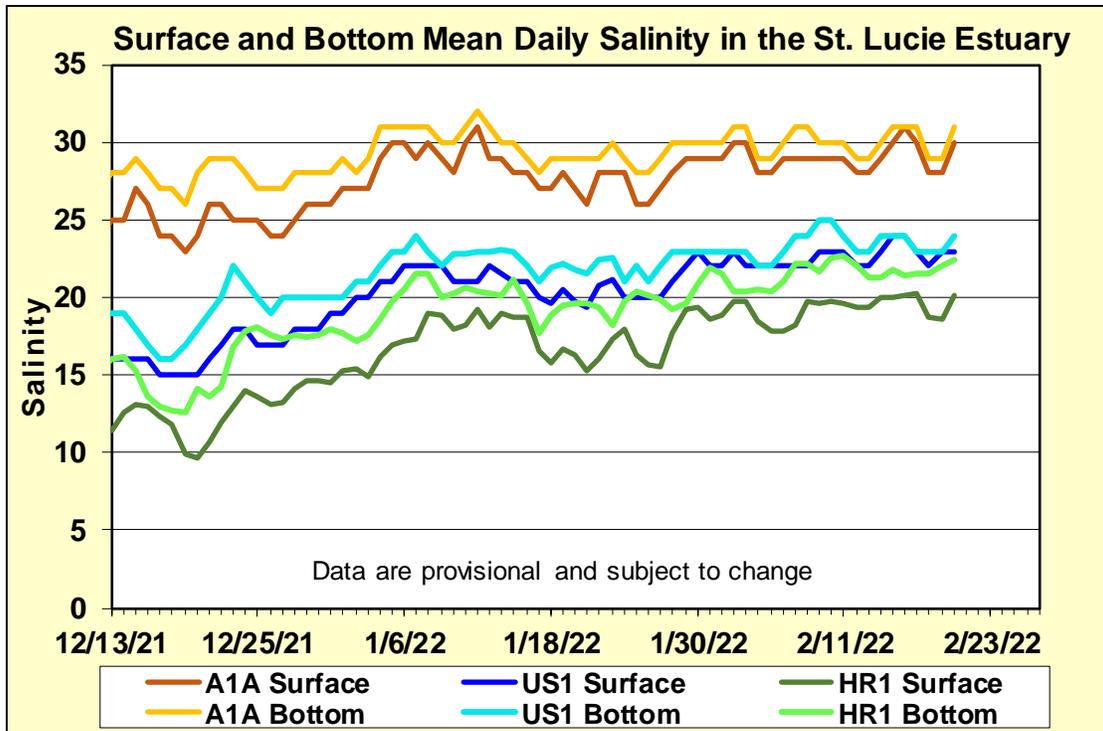
### Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are dry. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee River Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

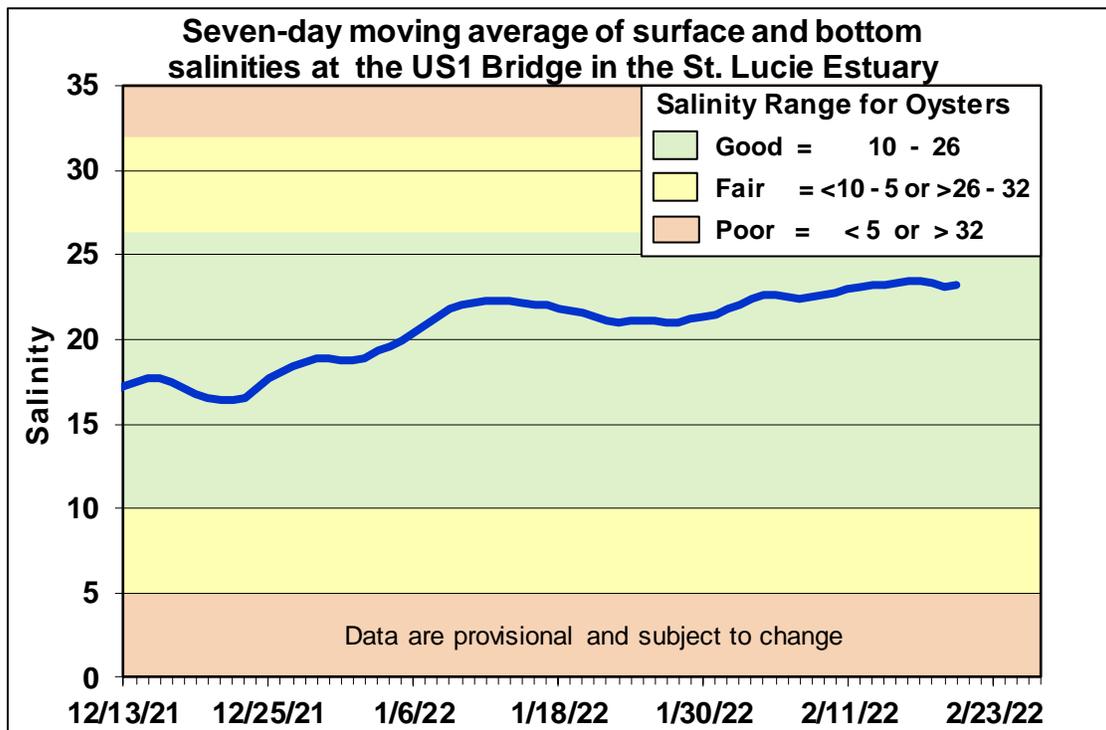


**Figure ES-1.** Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

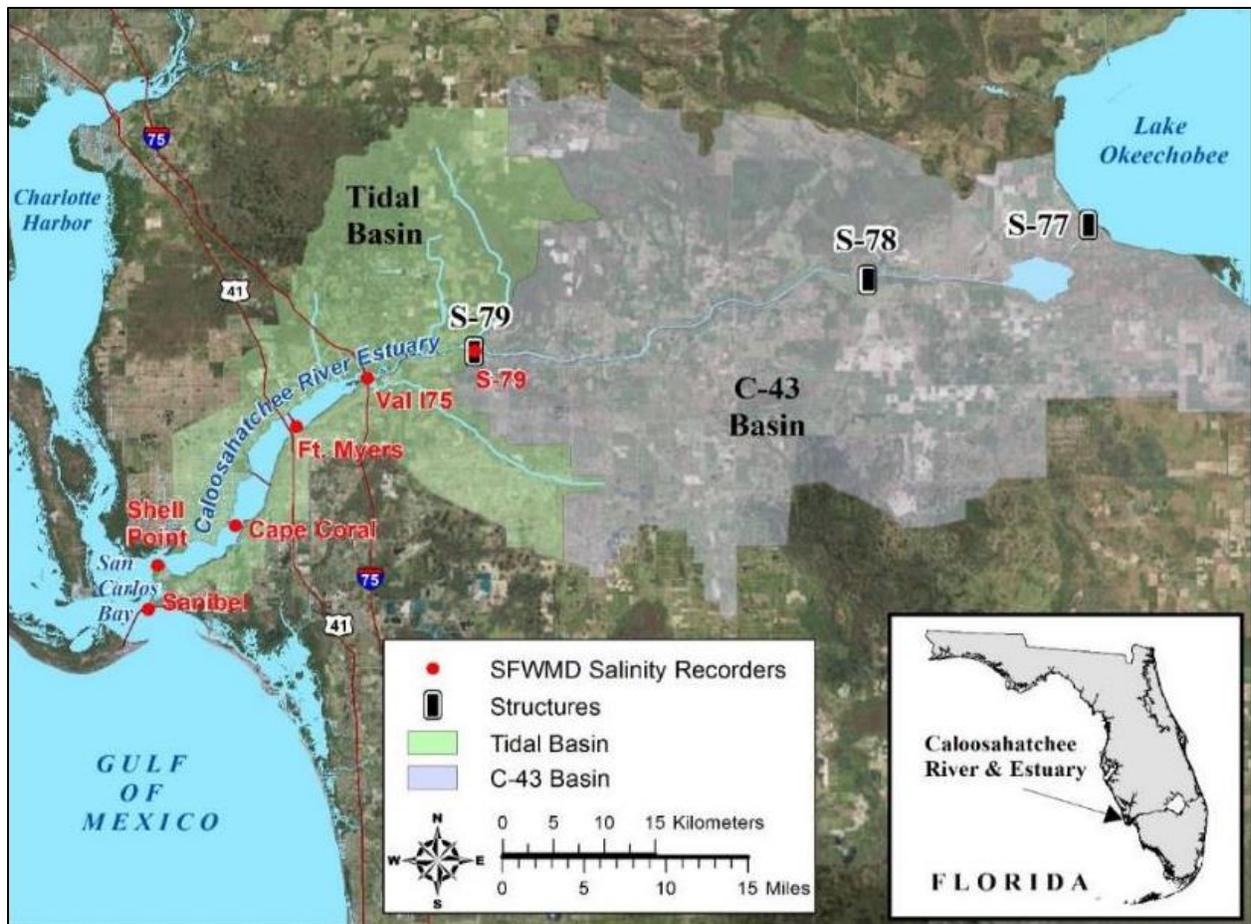




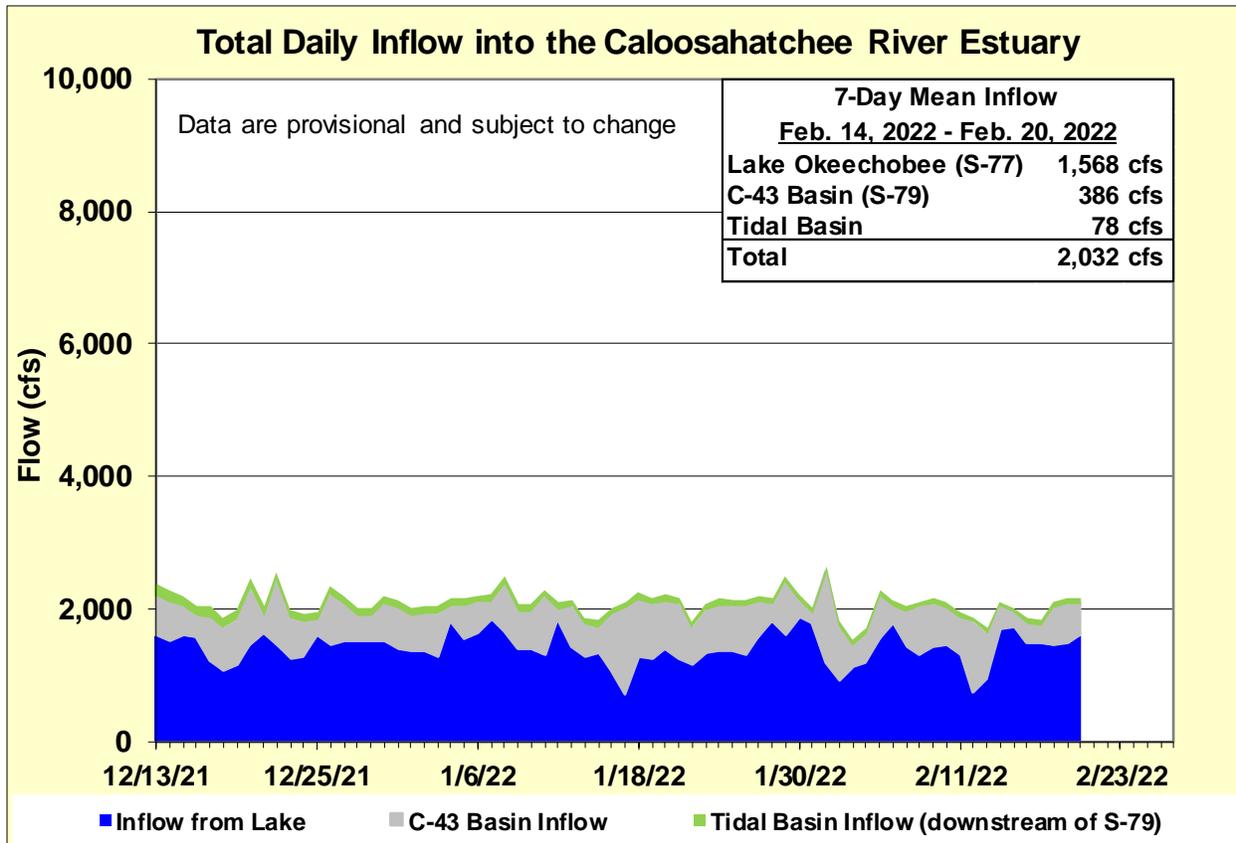
**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.



**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



**Figure ES-5.** Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.



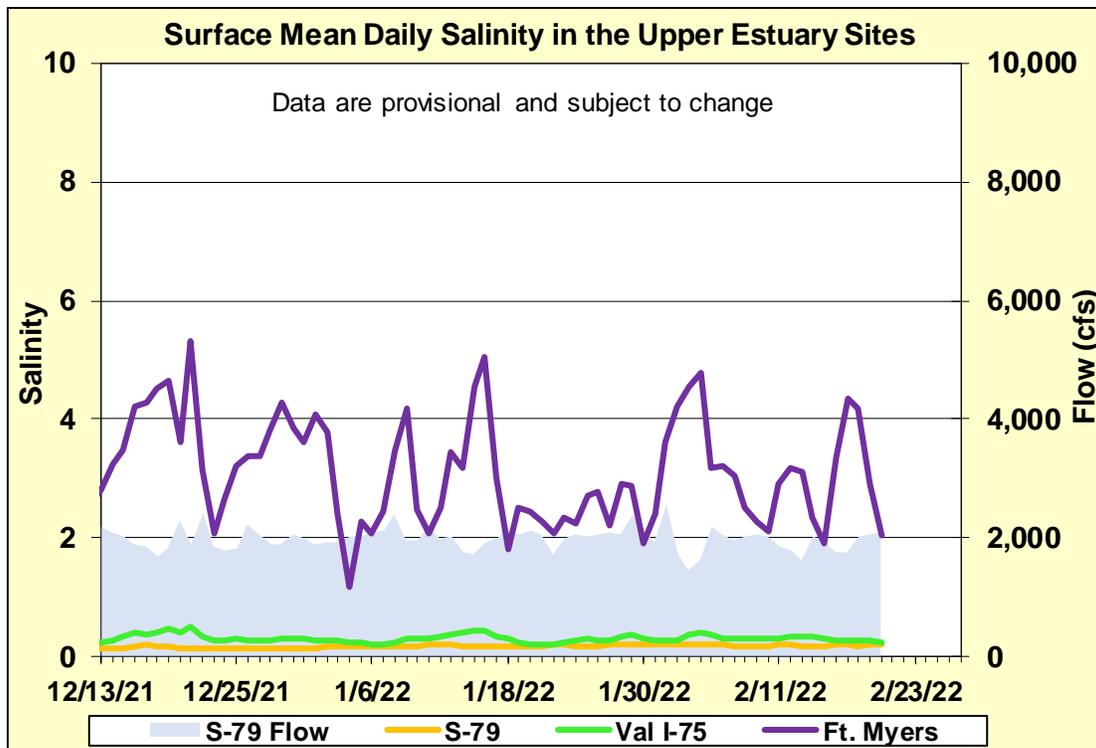
**Figure ES-6.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**Table ES-2.** Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope at I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary is the preferred salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

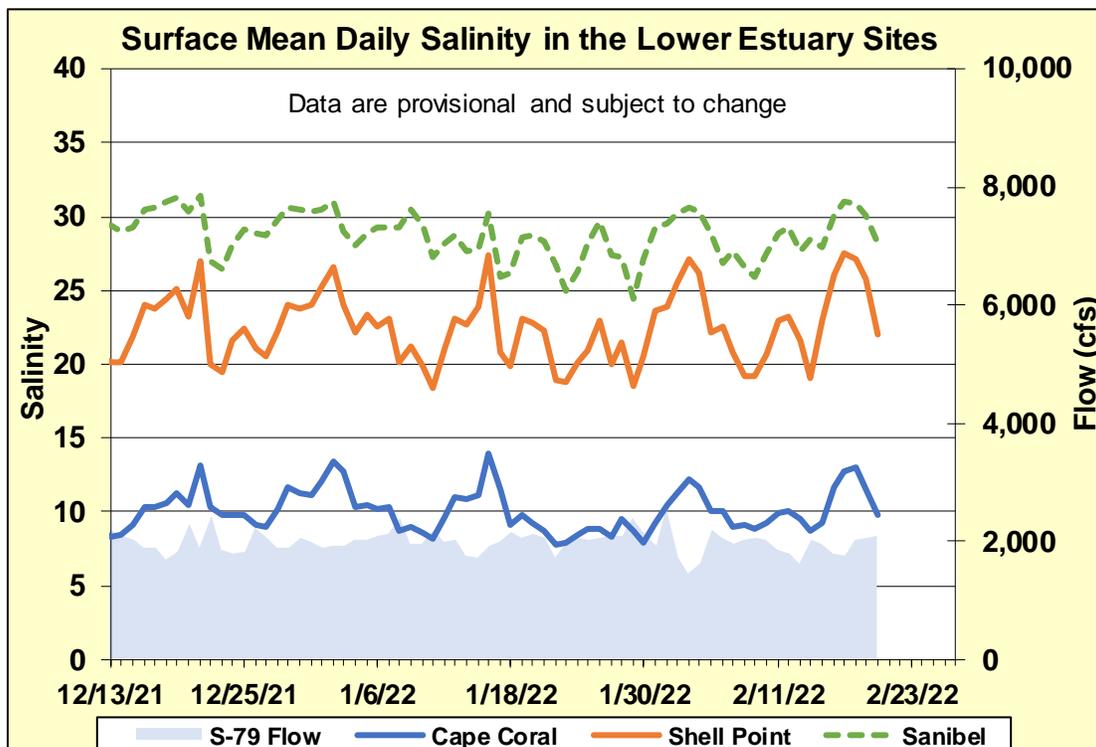
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA <sup>a</sup>
Val I-75	<b>0.3</b> (0.3)	<b>0.3</b> (0.5)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>3.0</b> (2.7)	<b>4.5</b> (5.3)	NA <sup>a</sup>
Cape Coral	<b>11.0</b> (9.4)	<b>12.3</b> (10.9)	10.0 – 30.0
Shell Point	<b>24.4</b> (21.1)	<b>24.8</b> (22.8)	10.0 – 30.0
Sanibel	<b>29.5</b> (27.6)	<b>29.9</b> (29.0)	10.0 – 30.0

a. The envelope is not applicable.

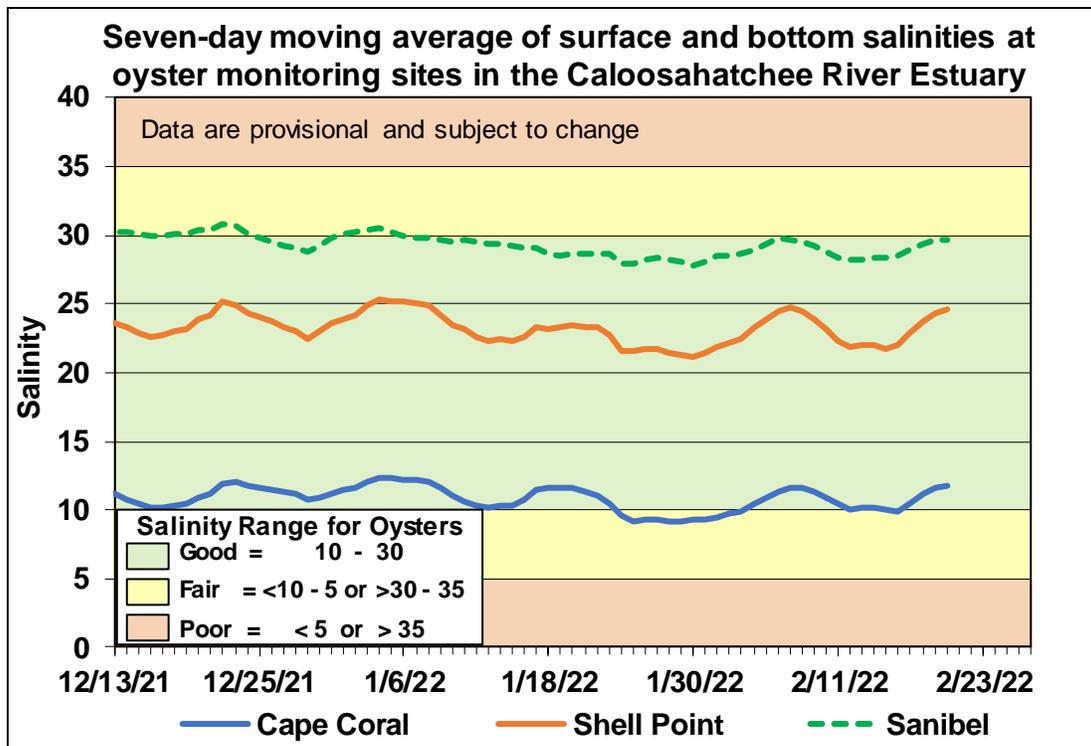
b. The envelope is based on the predicted 30-day mean for the next two weeks.



**Figure ES-7.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**Figure ES-8.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

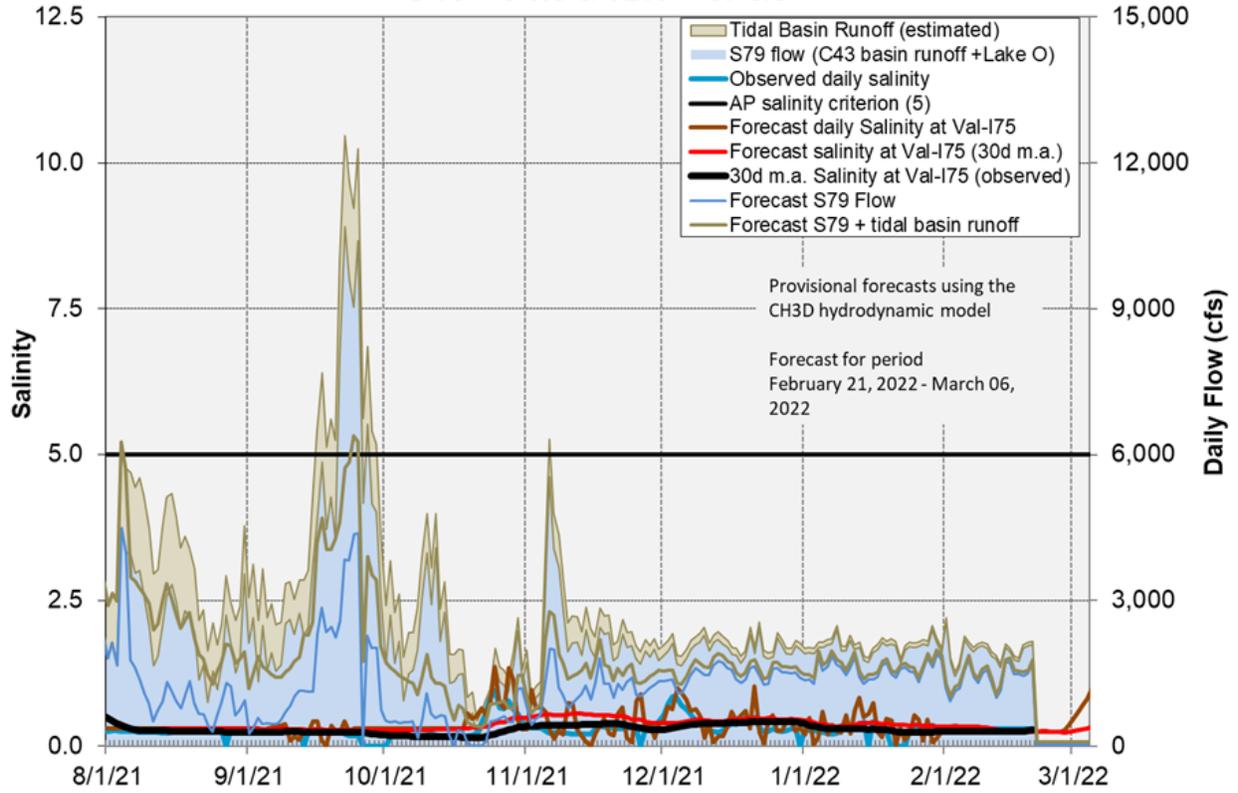


**Figure ES-9.** Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

**Table ES-3.** Predicted salinity at Val I-75 in the Caloosahatchee River Estuary at the end of the forecast period for various S-79 flow release scenarios.

Scenario	Simulated S-79 Flow (cfs)	Tidal Basin Runoff (cfs)	Daily Salinity	30-Day Mean Salinity
A	0	71	1.2	0.4
B	450	71	0.6	0.3
C	800	71	0.4	0.3
D	1000	71	0.3	0.3
E	1500	71	0.3	0.3
F	2000	71	0.3	0.3

Caloosahatchee River Estuary Flows and Salinity  
 Observed and Forecast Salinity at Val I-75  
**S-79 = 0 cfs & TBR = 67 cfs**



**Figure ES-10.** Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

## Stormwater Treatment Areas

**STA-1E:** STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and the Eastern Flow-way is offline for vegetation management activities including rip-rap repairs related to Tropical Storm Eta. Operational restrictions are in place in STA-1E Central Flow-way for vegetation management activities. Online treatment cells are at or above target stage and vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rates (PLRs) is high for the Central Flow-way (**Figure S-1**).

**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are at or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Northern, Western, and Eastern Flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-2**).

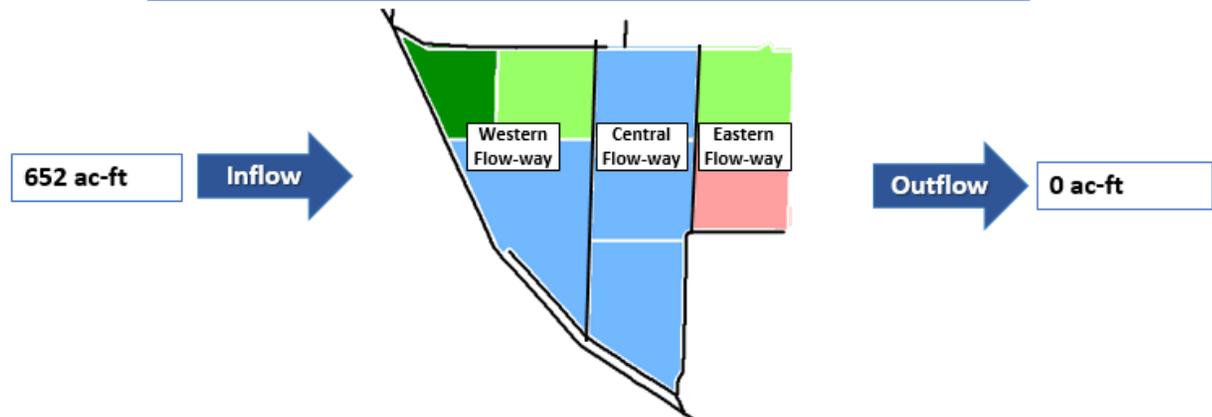
**STA-2:** STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 1, 3 and 4 for vegetation management activities. Online treatment cells are at or near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4 and 5 is highly stressed. The 365-day PLRs for Flow-ways 1, 4 and 5 are below 1.0 g/m<sup>2</sup>/year. The 365-day PLR for Flow-way 3 is high (**Figure S-3**).

**STA-3/4:** STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Most online treatment cells are at or near target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for the Central and Western Flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-4**).

**STA-5/6:** STA-5/6 Flow-way 4 is offline for vegetation management activities. Most treatment cells are below target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy. The 365-day PLRs for flow-ways 1, 6, 7, and 8 are below 1.0 g/m<sup>2</sup>/year. The 365-day PLRs for flow-ways 4 and 5 are high. (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

**STA-1E Weekly Status Report – 2/14/2022 through 2/20/2022**



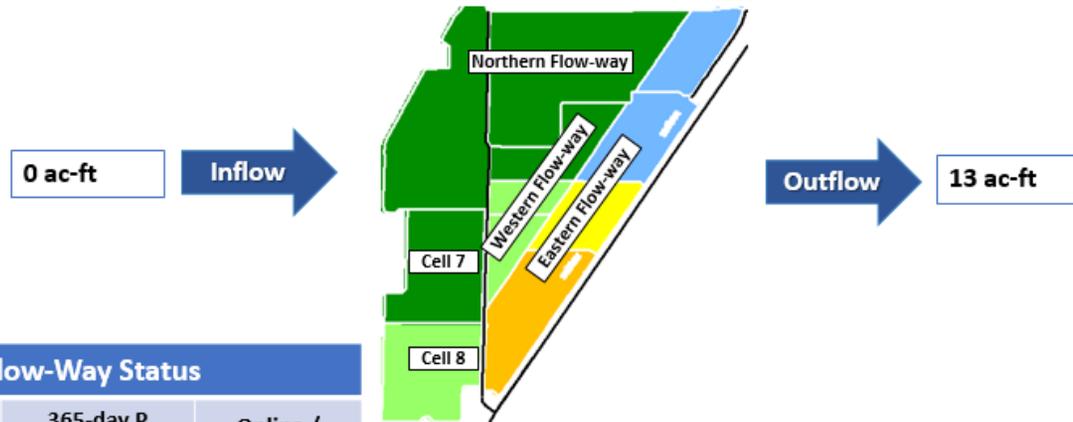
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ——— Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
Eastern	←————→		Offline, Tropical Storm Eta repairs starting 01/24/2022
Central	←————→		Vegetation Rehab
Western	←————→		Offline, construction activities starting 11/01/2019

As of 2/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	652	2,883	179,706
--Lake Inflow, ac-ft	0	N/A	5,800
Total Outflow, ac-ft	0	1,376	150,538
Inflow Conc., ppb	63	56	122
Outflow Conc., ppb	N/A	26	23
Includes Preliminary Data			

**Figure S-1.** STA-1E Weekly Status Report

STA-1W Weekly Status Report – 2/14/2022 through 2/20/2022



STA-1W Flow-Way Status

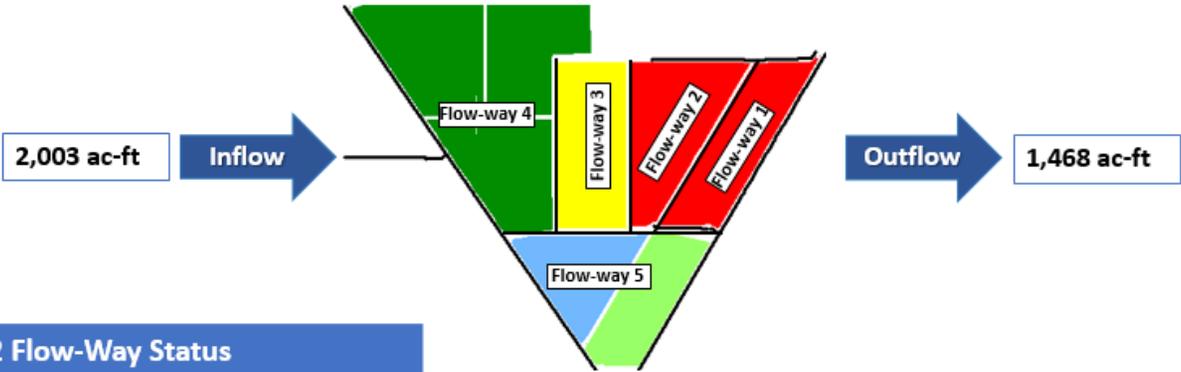
Flow-Way	Vegetation Status Healthy ← Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
Northern	← Healthy →	1.0	Construction
Western	← Healthy →	1.0	Construction
Eastern	← Healthy →	1.0	Construction
Cell 7	← Healthy →	N/A	Construction
Cell 8	← Healthy →	N/A	Construction

As of 2/20/2022	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

STA-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	0	616	54,037
--Lake Inflow, ac-ft	0	N/A	4,700
Total Outflow, ac-ft	13	16	53,073
Inflow Conc., ppb	N/A	93	168
Outflow Conc., ppb	19	20	24
Includes Preliminary Data			

Figure S-2. STA-1W Weekly Status Report

STA-2 Weekly Status Report – 2/14/2022 through 2/20/2022



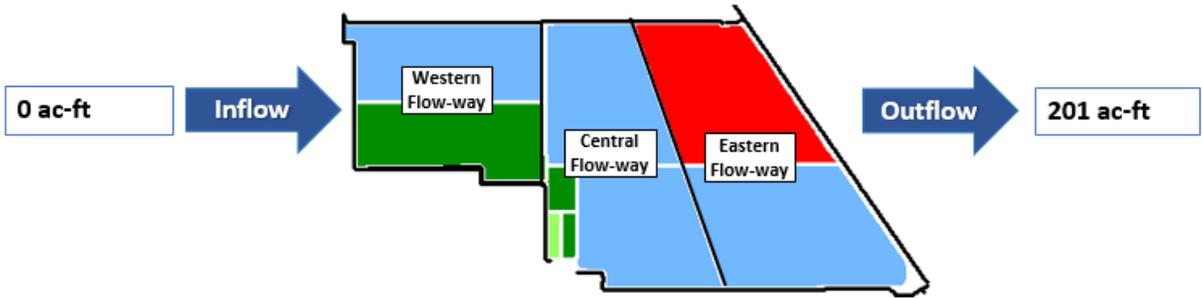
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P / m<sup>2</sup>/yr is optimal)</small>	Online / Offline / Restrictions
1			Vegetation Management
2	Offline, construction activities as of 9/7/2021		
3			Vegetation Rehab
4			Vegetation Rehab
5			Online

As of 2/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	75-100% Dry
	50-75% Dry

STA-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	2,003	6,936	329,124
--Lake Inflow, ac-ft	600	N/A	67,700
Total Outflow, ac-ft	1,468	5,692	338,714
Inflow Conc., ppb	33	43	86
Outflow Conc., ppb	10	11	15
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

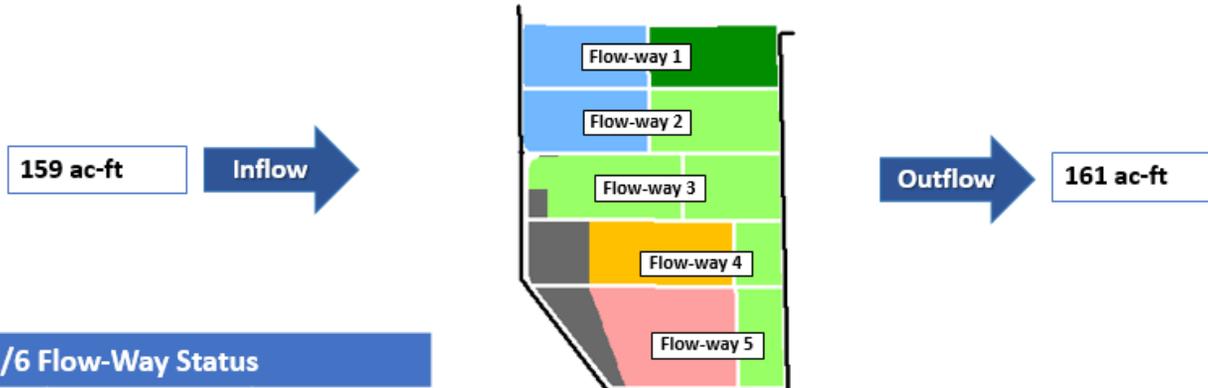
STA-3/4 Weekly Status Report – 2/14/2022 through 2/20/2022



STA-3/4 Flow-Way Status				As of 2/20/2022		STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy ——— Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)			7-day	28-day	365-day
Eastern	Offline, vegetation management drawdown as of 3/1/2021			<ul style="list-style-type: none"> <li>Deep Water Level (&gt; 2.8' above TS)</li> <li>High Water Level (1.5' – 2.8' above TS)</li> <li>0.2' – 1.5' above TS</li> <li>Target Stage (TS +/- 0.2')</li> <li>Low Water Level (&lt;0.2' below TS)</li> </ul>		Total Inflow, ac-ft	0	0	358,535
Central	← →	1.0	Online	Depth / Area Based: Percent of Area Dry		--Lake Inflow, ac-ft	0	N/A	38,900
Western	← →	1.0	Online	<ul style="list-style-type: none"> <li>0-25% Dry</li> <li>25-50% Dry</li> <li>50-75% Dry</li> <li>75-100% Dry</li> </ul>		Total Outflow, ac-ft	201	1,753	316,772
						Inflow Conc., ppb	N/A	N/A	65
						Outflow Conc., ppb	18	20	15
Includes Preliminary Data									

Figure S-4. STA-3/4 Weekly Status Report

STA-5/6 Weekly Status Report – 2/14/2022 through 2/20/2022



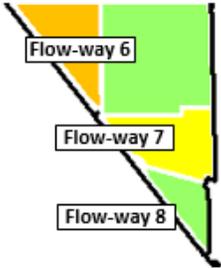
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →	N/A	Online
3	← →	N/A	Online
4	Offline, vegetation management starting 01/24/2022		
5	← →		Online

As of 2/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	159	1,704	177,761
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	161	914	169,240
Inflow Conc., ppb	92	89	243
Outflow Conc., ppb	16	13	50
Includes Preliminary Data			

Figure S-5. STA-5/6 Weekly Status Report (Flow-ways 1 – 5)

STA-5/6 Weekly Status Report – 2/14/2022 through 2/20/2022



STA-5/6 Flow-Way Status				As of 2/20/2022	
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)	
				Deep Water Level (> 2.8' above TS)	High Water Level (1.5' – 2.8' above TS)
6	←-----→	 1.0	Online	0.2' – 1.5' above TS	Target Stage (TS +/- 0.2')
7	←-----→	 1.0	Online	Low Water Level (<0.2' below TS)	Depth / Area Based: Percent of Area Dry
8	←-----→	 1.0	Online	0-25% Dry	50-75% Dry
				25-50% Dry	75-100% Dry

**Figure S-6.** STA-5/6 Weekly Status Report (Flow-ways 6 – 8)

## Basic Concepts and Definitions for STA Weekly Status Report

- **Inflow:** Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow:** Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow:** Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus (TP):** Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration:** TP concentration is the mass of TP in micrograms per liter of water,  $\mu\text{g/L}$  or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration:** The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL:** The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way (FW):** One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status:** Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate (PLR):** Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online:** Online status means the FW can receive and treat inflow.
- **Online with Restriction:** The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline:** The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth:** Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note:** The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

## **Everglades**

### ***Water Conservation Area Regulation Schedules***

WCA-1: The 1-8C stage fell just faster than the slope of the Zone A1 regulation line last week. The average on Sunday was 0.42 feet above that line. WCA-2A: Stage at 2A-17 ascended again last week leveling at the end of the week; the average at that gauge on Sunday was 1.24 feet higher than the regulation line. WCA-3A: Last week the Three Gauge Average stages fell in parallel with the Zone A regulation line; average stage was 0.72 feet below the Zone A regulation on Sunday. WCA-3A: Stage continued to rise at gauge 62 (Northwest corner) last week, the average on Sunday was 0.66 feet below the regulation line (**Figures EV-1 through EV-4**).

### ***Water Depths***

Water depths and hydro-patterns have been relatively stable in WCA-1 over the last two months. Within the WCAs water depths are the lowest in northeastern WCA-3A, where the amount of area with water below the soil surface continues to expand. North to South hydrologic connectivity has diminished but remains within Everglades National Park sloughs. The western marl prairies and southern BCNP are dry as is typical but not favorable for this time of year (**Figure EV-5**). Comparing current WDAT water depths to the depth one month ago, stages are decreasing slowly in the WCAs with northern WCA-2A and northwestern WCA-3A North unchanged or even gaining in water depth. Looking back one year, most of the EPA south of northern WCA-2A is lower in depth, most significantly in eastern WCA-3A along the L-67s (**Figure EV-6**). Comparing current depths to the past 20 years, northwestern WCA-3A is above the 50th percentile with the northeastern region well below. WCA-1 and NE SRS remain above the 90<sup>th</sup> percentile (**Figure EV-7**).

### ***Taylor Slough and Florida Bay***

Very little rain (0.04 inches) fell over Taylor Slough and Florida Bay during the week ending Sunday, 2/20. Stages in Taylor Slough decreased an average of 0.03 feet over this past week with the largest weekly change of -0.16 feet in the northern Taylor Slough area (**Figures EV-8 and EV-9**). The Slough, as a whole, is 10 inches higher than average while the northern parts are 18 inches higher than the historical average for this time of year. Given the probability of a drier than average dry season, maintaining water deliveries to the area would slow the recession in the slough so water movements south can be expedited once the wet season starts. Compared to last year's high-water levels, current condition is 3 inches lower than this time last year.

Salinities in Florida Bay averaged an increase of 0.7 over the week ending 2/20, with individual station changes ranging from -1.0 to +2.8 (**Figure EV-8**). Weekly creek flow decreased to 5,500 acre-feet which is still twice the historical average for this time of year. These flows and recent rainfall have helped to keep salinities from rising within Florida Bay. The large changes in the central region average in recent months (**Figure EV-10**) have been driven by the coastal station in that region while the more bayward station has stayed pretty consistently in the low 30's during the last 2 months. Bay average salinity is 1.5 higher than the historical average for this time of year.

### **Water Management Recommendations**

Conserving water in the northern basins, then allowing that water to move downstream as we transition into the dry season maximizes the ecological benefit of freshwater on the landscape. This approach is being demonstrated now, with WCA-1 and STA2 discharges hydrating northern WCA-2A, being picked up by the S-7 structure, which then supplies northeast and northwest WCA-3A North, Holeyland, and Rotenberger WMAs. This operation is more ecologically advantageous than outflow from the S-11 structures as long as a recession rate can be returned to WCA-2A.

If conditions warrant additional discharges at the S-10s, they should be split with 70% of discharge coming from S-10C (up to 700 cfs) and 30% from S-10A. Stage conditions in northeastern WCA-3AN continue to warrant further consideration as aerial imagery confirms model output indicating very dry, below average levels **BUT** recent inflows via the S-150 were anecdotally confirmed from the air on Friday as having a positive result on stages in northeastern WCA-3A. If conditions allow, operational discharges into both the western and the eastern WCA-3A water control structures has greater benefit than discharges to the west alone. Continued freshwater to the Taylor Slough area, a discharge amount that maintains stage will help expedite deliveries to the south when the wet season begins. Individual regional recommendations can be found in **Table EV-2**.

**Table EV-2.** Previous week's rainfall and water depth changes in Everglades regions.

<b>Everglades Region</b>	<b>Rainfall (inches)</b>	<b>Stage change (feet)</b>
WCA-1	0.13	-0.14
WCA-2A	0.68	+0.04
WCA-2B	0.35	-0.08
WCA-3A	0.17	-0.07
WCA-3B	0.25	-0.07
ENP	0.19	-0.02

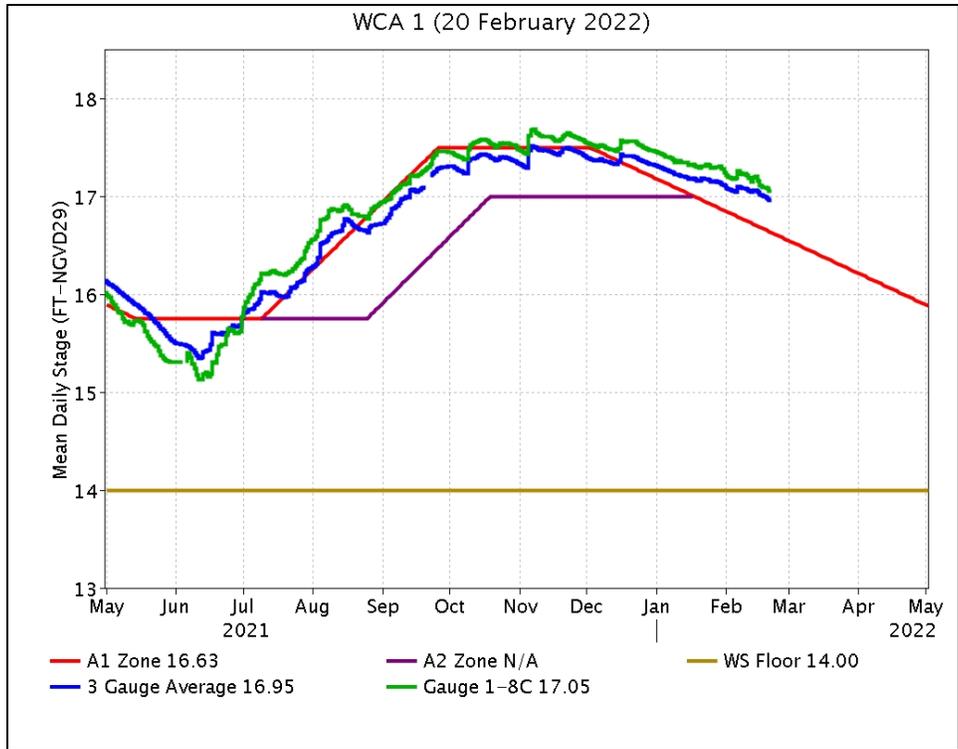


Figure EV-1. WCA-1 stage hydrographs and regulation schedule.

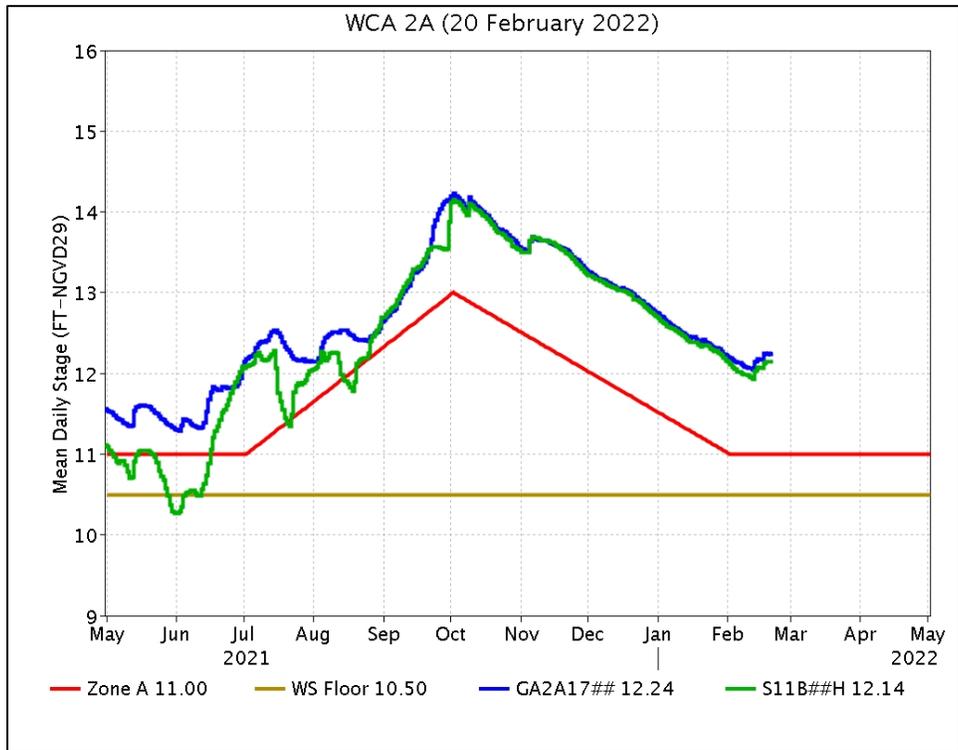
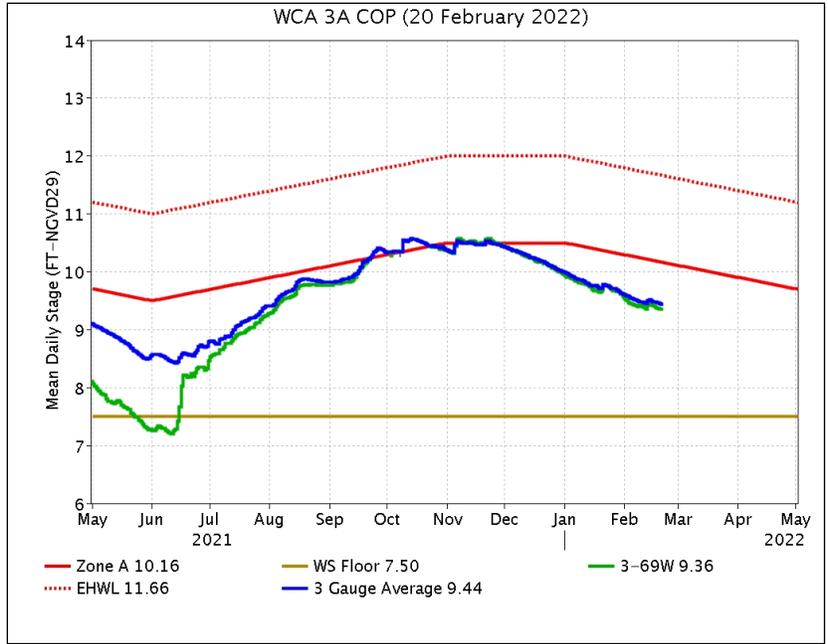
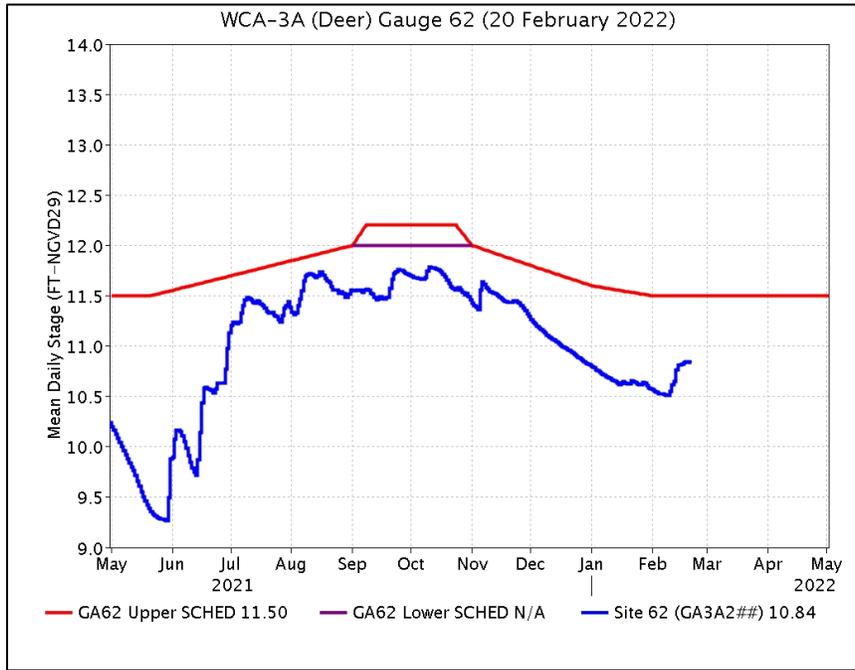


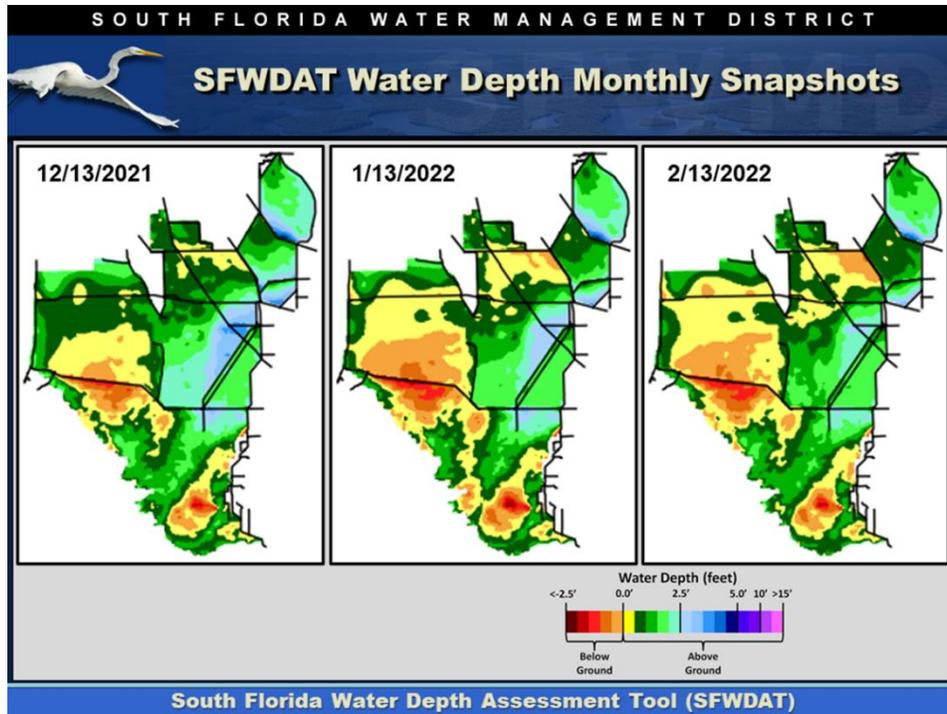
Figure EV-2. WCA-2A stage hydrographs and regulation schedule.



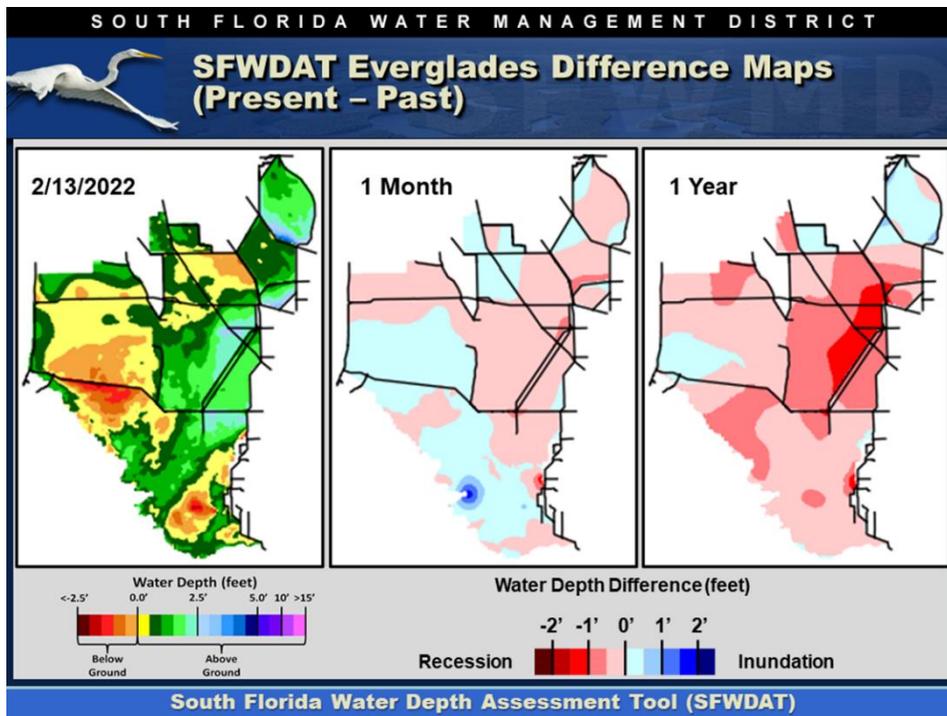
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.



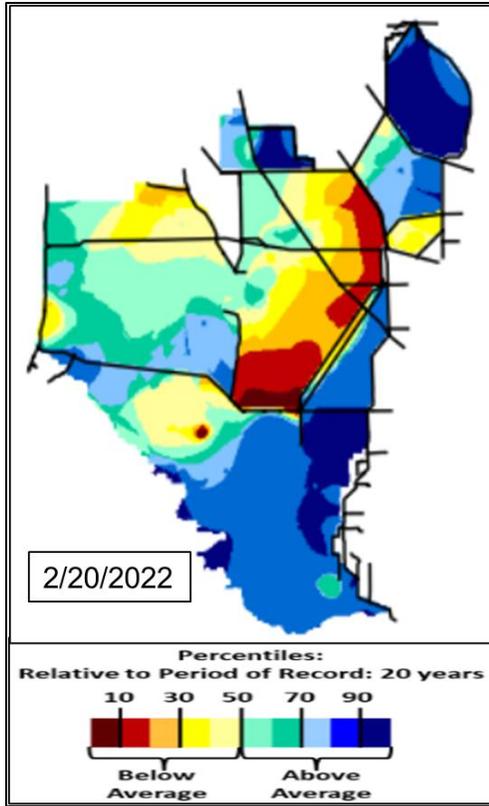
**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.



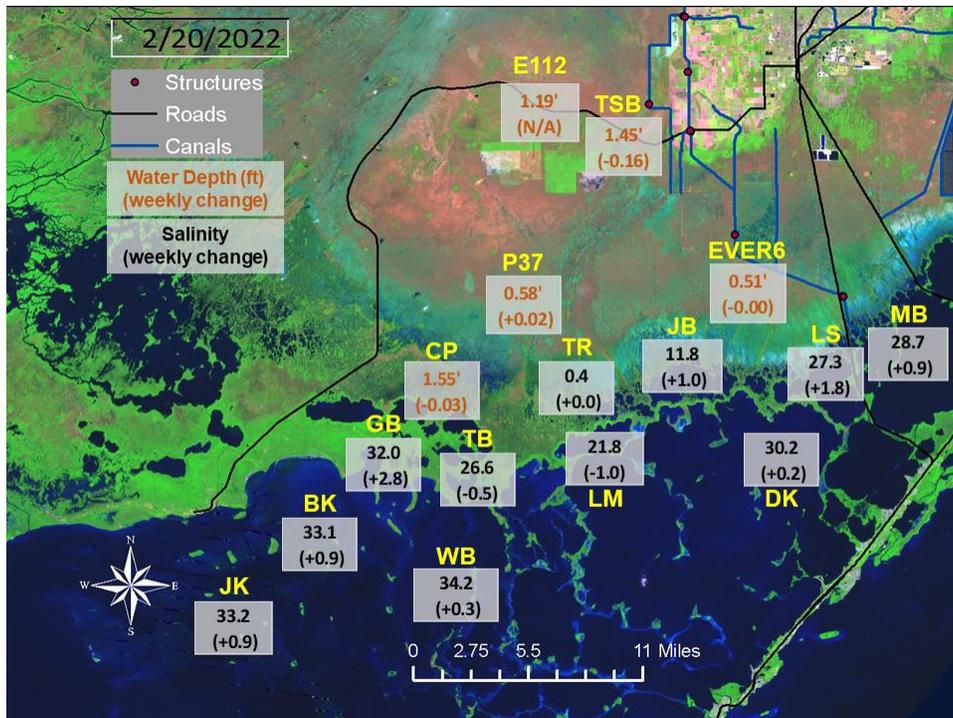
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



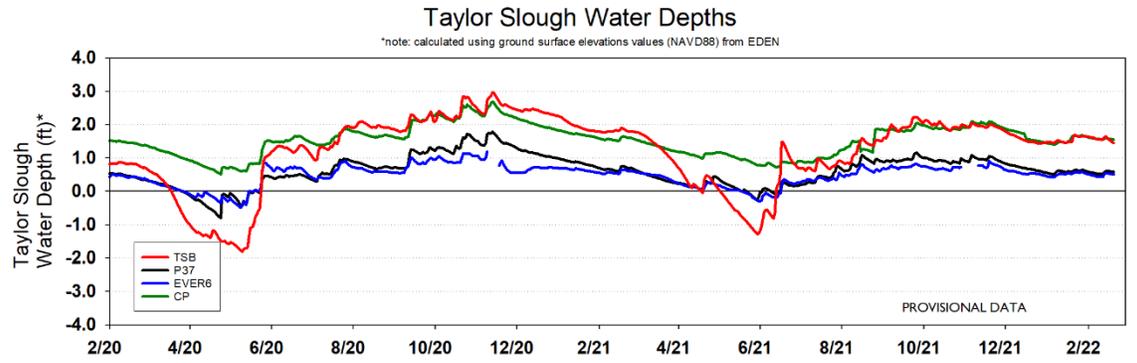
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



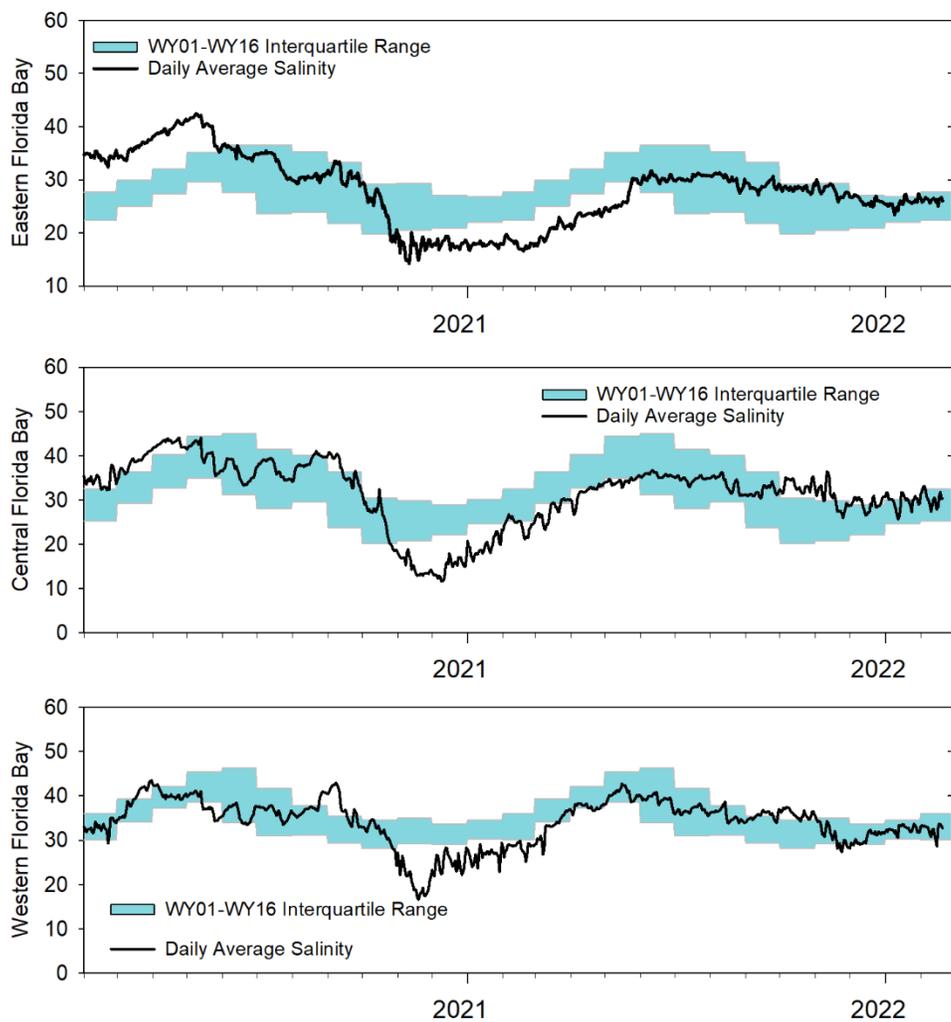
**Figure EV-7.** Present water depths compared to the day of year median over the previous 20 years.



**Figure EV-8.** Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.



**Figure EV-9.** Taylor Slough water depth time series.



**Figure EV-10.** Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

**Table EV-2.** Weekly water depth changes and water management recommendations

<b>SFWMD Everglades Ecological Recommendations, February 22, 2022 (red is new)</b>			
<b>Area</b>	<b>Weekly change</b>	<b>Recommendation</b>	<b>Reasons</b>
<b>WCA-1</b>	Stage decreased by 0.14'	Allow water to move south from this basin until stages reach the regulation schedule. Return to a recession rate of less than 0.10 feet per week.	Protect within basin and downstream habitat and wildlife. Stages are above the 90 <sup>th</sup> percentile.
<b>WCA-2A</b>	Stage increased by 0.04'	Conserve water in this basin letting the water move south when conditions allow, with northern WCA-3A as the priority for receiving discharge. A recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife. Protect peat soil and future wading bird forage as the dry season progresses.
<b>WCA-2B</b>	Stage decreased by 0.08'	Conserve water in this basin, maintain a minimum input to maintain stage while moving water south when conditions allow.	Protect within basin and downstream habitat and wildlife.
<b>WCA-3A NE</b>	Stage decreased by 0.11'	Conserve water in this basin, while letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin peat soils, and downstream habitat and wildlife. Maintaining stage above 9.5' NGVD at 3A-3 (or gauge 63) prior to March 15 will increase the probability of successful nesting at the Alley North colony
<b>WCA-3A NW</b>	Stage increased by 0.03'	Conserve water in this basin letting the water move south when conditions allow. Returning to a recession rate less than 0.10 feet per week has an ecological benefit.	
<b>Central WCA-3A S</b>	Stage decreased by 0.11'	Return to a recession rate that is less than 0.10 feet per week. Allow flows to move south when conditions allow.	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage increased by 0.07'		
<b>WCA-3B</b>	Stage decreased by 0.07'	Maintain recession rates of less than 0.10 feet per week in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife.
<b>ENP-SRS</b>	Stage decreased by 0.02'	Make discharges to ENP according to COP and TFFF protocol while adaptively considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
<b>Taylor Slough</b>	Stage changes ranged from -0.16' to +0.02'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged -1.0 to +2.8	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.